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TO CORRESPONDENTS.

J. S. and others.—*We are unacquainted with the cause of the delay in the issue of the new edition of Mr. Clegg's work. His address is No.* 11, *Buckingham-street, Strand.*

W. L.—*The deposit is sulphate of copper and sulphate of zinc, produced by the action of sulphuric acid on the copper condensing tube. This indicates the presence of sulphur, in some form, in the gas; probably as the bi-sulphuret of carbon.*

G. M.—*The tables of the discharge of gas through pipes presume the pipes to be laid in a straight line and upon a level. The pressure in the pipes at any given distance is to be deducted from the initial pressure, and the residue is the motive power. In the case assumed by you, the extremity of the pipe must be open to the air, otherwise the motive power would not be equal to the initial pressure.*

NOTICES.

Being unwilling to put any of our foreign subscribers to the expense of the postage of a letter, reminding them of their arrears of subscription, we take this means of requesting remittances of the amounts due from subscribers in the following cities:—Aix-la-Chapelle, Baltimore, Charleston, Cologne, Frankfort-on-the-Maine, Geneva, Ghent, Gothemburg, Halifax N.S., Hamburg, Lille, Liege, New Orleans, New York, and Paris.

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All communications and orders for Advertisements to be addressed to the Editor, 32, Bucklersbury, London.

The Editor will be particularly obliged by his friends forwarding to him Notices of all Meetings, Trials, or Appeals, which it may be interesting to the Gas World to have reported.

Circular to Gas Companies.

Petitions have been presented against four of the gas bills now before Parliament, viz, the Leeds, Preston, Nottingham, and Bristol bills. The opposition against the first-named comes from the Town Council, who have it in contemplation to take the supply of gas into their own hands upon the Manchester system, and are, therefore, unwilling to allow of any extension of the works of the existing companies; the intention, therefore, is to throw out the bill altogether. In the other cases, the opponents wish to introduce clauses, similar to those in the Great Central Bill, for appointing an inspector of meters, fixing a maximum price of gas, and defining the minimum quality. It is to be hoped that some more satisfactory clause will be framed for the latter purpose than is contained in the bill of the Great Central Company, the standard of which, the chemical referee in that case states in his last report, to be susceptible of variations extending from 13·5 to 20·9, and is now definitively abandoned. As to fixing the price of gas by act of Parliament, it is as absurd as any similar attempt to regulate the price of the quartern loaf, more especially at a moment when the standard of value is undergoing a sensible transmutation, and every element of the cost of manufacturing gas is rising rapidly in price.

The decision of the Lord Chancellor and the Lords Justices in the Sheffield case is an important fact in the application of our principles of jurisprudence to an extensive modern industry; and, if not reversed on appeal to the House of Lords, it establishes a precedent which must govern future cases of a similar nature, and to which all must bow, though we cannot say we are satisfied with either its justice or its equity. Parliament, in passing an act for the incorporation of a gas company, imposes upon them numerous onerous obligations and duties for the protection of the public, to which an unincorporated gas company is not subject. It must also be borne in mind that gas consumers, for whose benefit competing companies are presumed to be established, are but a fraction of the public; and, if this judgment stands, the latter are completely at the mercy of every body of speculating traders in gas, whose proceedings are admitted on all hands to be illegal. The extension of some of the provisions of the Gas Work Clauses Consolidation Act to all future unincorporated gas companies would, probably, remedy this inconvenience; but, at all events, the evil is one which calls for some legislative remedy. The carefully considered judgment of Lord Justice Knight Bruce will be perused with profit by all who take an interest in this question.

The cause of the Imperial Gas Company *v.* the London Gas Company was set down for trial at the late sittings of the Court of Exchequer, at Guildhall, but was not heard in consequence of the length of time occupied in disposing of the causes which preceded it. Many of our readers are aware that the question raised is, whether a number of the defendants' service-pipes were accidentally and inadvertently, or intentionally and systematically, inserted into the main pipes of the plaintiffs, who had thus been supplying the gas, while the defendants were receiving its value. The cause now stands over till the sitting of the court in July.

PROSPECTS OF ELECTRICAL ILLUMINATION.*

It is now many years since Dr. Whiston first designated a knave as a "fool with a circumbendibus," and it seems to us pretty clear that, had the worthy prelate been now alive, he would have had no difficulty in describing the project, to which the above pamphlet acts the part of accoucheur, as "a foolish scheme with a coloured circumbendibus." We have no wish to be unnecessarily severe, but it has been well and wisely said, "he who spareth the rod spoileth the child," and certainly the present is one of these cases which require decided public correction and exposure. If we could make ourselves believe for one moment, that the projector of this glaring bubble was sincere in the preposterous folly of so wild a vision, our remarks should savour rather of pity than resentment; but what are we to think of a man who comes before the world in the

* "A few Remarks on the Present State and Prospects of Electrica Illumination." By Joseph J. W. Watson, Ph. D., F.G.S., M.S.A., &c. With a description of the author's patented inventions in galvanic batteries and electric lamps. Saunders and Stanford, Charing-cross. 1853.

character of a Ph. D., F.G.S., M.S.A., &c.? Can such a personage be ignorant of the simplest facts in manufacturing chemistry? Can one appropriating to himself so large a share of the alphabet, be the dupe of an over-excited imagination, in respect to the dry and unromantic details of "profit and loss?" Yet we are to have electricity for nothing! nay, we are to have it for less than nothing!! We are to realise a fortune out of its mere consumption; and "*produce no less than* 100 *valuable pigments, transcending by a great per centage the original value of the articles contributing towards their production!!!*" "*Apres moi le deluge*," said a well-known politician; but what, in the name of wonder, can come after this to astonish the visual organs of mankind.

Soberly and sadly, however, we must put a stop to "badinage," and seriously denounce the vicious condition into which a phlethora of gold has driven our national organ of scheming. Grant that money is now abundant, that the supplies of gold from Australia and California are, in our day at least, inexhaustible; that employment must be had for our capital, and that it is better to employ it at home than abroad; still, there must be many reasonable and practicable purposes to fulfil ere it becomes requisite to enter rashly upon projects like the chromatic battery and its adjuncts. In fact, if we were prepared to admit the preliminary arguments put forth in the brochure of Dr. Watson, we should only find ourselves all the more puzzled to discover a reason why the electric light has been mixed up with the scheme he advocates. The colours, it seems, can be made and sold at an excellent profit; why, then, write a pamphlet of thirty-one pages to mix up this profitable manufacture with an electrical light, which nobody wants, and which has never given satisfaction, and never will. Electricity, again, is Dr. Watson's waste product; but when we reflect upon the highly important uses to which it is well known that this agent can be applied, there arises an overwhelming sentiment of suspicion at perceiving the most intangible and worthless of all these applications selected by the advocate of the chromatic battery for illustrating the advantages of his project. Why not make soda and chlorine from common salt? This is the true use, and the only unmistakable purpose, to which waste electricity can be applied. Compare for one moment the practical facts of the two cases, and the advantages become manifest at once. Of course we concede for the sake of argument, and for the sake of argument only, the question of profitable colour-making. But, let us not be misunderstood here: the colour-making is, in our opinion, not one whit less visionary and impracticable than any other portion of the scheme. We are not blinded by the electric light from perceiving the instability of the fabric upon which it is reared. But, for argument's sake, we admit the whole of the chromatic hypothesis, and now proceed to deal with our electricity. As a means of illumination, the electric light is decidedly defective; it possesses great intensity, but very little quantity; hence its shadows are intensely black, and its luminous rays painfully white. The eye is consequently unable to bear the severe transitions consequent upon this form of lighting; and it is not saying too much to assert that, even if capable of being supplied for nothing, the electric light would not long be used for the purpose of general illumination, but become limited to specific purposes, such as that of marine signals and lighthouses. At best, therefore, it is dubious whether the public would accept, and still less pay, for electricity applied in this way; whereas there cannot exist the shadow of a doubt concerning the result of its employment for the purpose we have indicated. No two substances can command a readier sale than chlorine and soda, and no article of commerce can be procured in larger quantities and with more facility than common salt. Now, let us see how the account stands in the supposition that electricity is to be had *ad libitum* and for nothing, as put forth in the pamphlet before us:—

Common salt is worth, say..	£1 per ton.
Pure caustic soda is worth ..	12 ,,
Pure chlorine, say	15 ,,

The equivalent of common salt being 50, that of soda 32, and of chlorine 36, it follows that 50 tons of salt, when acted on by electricity, which costs nothing, would produce 32 tons of soda and 36 tons of chlorine; or, in other words, that £50 worth of salt will yield products worth £920! And this, be it observed, with less manual labour, wear and tear, and outlay for apparatus, than would be necessary for carrying out the electric light project, with its various regulators, lamps, &c. &c., according to the showing of even its advocate. Surely, then, this must be the proper field for the employment of electricity. And why has it not been adopted?—why, simply because it would bring the whole question to a decisive issue; whereas the electric light leaves the matter "*in nubibus*," and diverts attention from the real defect.

We have expressed our doubts as to the correctness of the colour-making part of this scheme, but, in reality, we have no doubt about the matter whatever: it is a monstrous absurdity from beginning to end, and does not even deserve the small notice we give it. To give our readers, however, some idea of the correctness of the data upon which some of the calculations are based, we quote the prices of chrome yellows as we find them in the pamphlet, and contrast these with the actual prices ruling now in the market, as handed to us by a large maker.

According to pamphlet—

Chromates of lead vary from.....	1s. 0d.	to 2s. 6d.	per lb.
The present prices are actually from	4½d.	,, 1s. 0d.	,,

A precisely similar discrepancy exists with regard to Prussian blue; but we have said enough to warn the most inexperienced; and, in fact, it is rather with a view to put down an unhealthy spirit of scheming, than from any importance we attach to electric lighting, that we have devoted so much space to the exposure of so hopeless an adventure.

We do not say to our readers, in the language of the East, "May your shadows never be less," but, in wishing them a fair amount of longevity, we say, "May you live till you see your shadows in the streets when lighted by electric lamps."

THE GAS QUESTION IN PARIS.

A *bond fide* proposal from responsible parties, to light, supply with gas, extinguish, and maintain in repair, 14,000 public lights, GRATIS, in consideration of a 21 years' monopoly of the supply of the same article to private consumers, at a uniform price of 6s. 8d. per 1000 cubic feet (30 centimes the cubic metre), is a startling fact, though emanating in a quarter prolific in novel theories and unexpected events. On the 13th of December last, the well-known and wealthy Paris banking-house of Ardoin and Co. placed such an offer in the hands of his Majesty the Emperor of the French, backed by an engagement to subscribe £1,600,000 sterling for the operation; and its consideration was referred to the Council of State.

We have already* placed before our readers the outline of a contract agreed to by the Municipal Council of Paris on the 12th of August last, subject to ratification by the Government authorities. That ratification encountered a formidable opposition from a minority of the Municipal Council, one of whose most distinguished members, M. Auguste Chevalier, has published an able memoir exposing the objections to a contract by which a monopoly was created for 31 years in the supply of an article, the cost of producing which was likely to be affected by new discoveries, and the application of scientific principles to a manufacture which had been hitherto conducted in total disregard of them.

By the existing contract between the gas companies and the municipal authorities (which does not expire till December, 1863, and has, consequently, more than ten years to run), the public lights are supplied on the basis of 5s. 9d. per 1000 feet in the populous districts, and 7s. 10d. in the less thickly inhabited ones, and the private consumers at 9s. 9d., subject to a diminution of about 3d. per 1000 feet on the latter till 1856, when the minimum price of 9s. would be attained. By the new contract an additional term of 21 years was to have been granted, in consideration of a reduction in the public lighting to one uniform rate of 4s. 6d. per 1000 feet, the scale of the present contract for private lights being maintained till 1863, when reductions were agreed to, by which it would again gradually descend to a minimum of 7s. 10d., and there remain till 1884.

M. Chevalier, in his memoir, enters at great length, and with considerable ability for a man inexperienced in the details of the art, into errors which he believes he has discovered in the accounts furnished by the gas companies, in elucidation of the cost of gas and coal, and the value of the residuary products, and thus terminates his protest:—

"The illustrious prince to whom France has confided its destinies, appears to attach great interest to all that relates to the embellishment of the capital; under his wise and firm

* See *Ante*, page 413, Vol. II.

government, commerce and industry daily take the greatest development; Paris is peopled with foreigners; prosperity revives as by enchantment, and the future presents itself to us under the most favourable auspices. The moment does not, therefore, seem to me to be well chosen for concluding a treaty with the gas companies, and thus pledging the city for 32 years. Is it urgent? No—nothing presses; the contract of 1846 only expires in 1863. The city can wait; it should do so; public interest requires it. In a few years many doubts will be solved—new processes will have been tried. In a few years the authorities, better instructed, may found upon more certain bases, a new treaty for gas lighting; the companies themselves will offer more acceptable terms. The adjournment of the treaty will prejudice none of the interested parties. The gas companies will continue to profit by the advantages of the contract of 1846. The city must, it is true, satisfy till 1863 the charges imposed upon it for the public lighting, but it will find in the future a large compensation for this momentary sacrifice."

Aroused by this forcible appeal, and knowing that the ratification of the projected contract would be immediately followed by a considerable rise in the value of the shares in the Paris gas companies, the attention of capitalists was drawn to the question; and we accordingly find Messrs. Ardoin and and Co. submitting direct to the Emperor an offer for lighting the city after December 31, 1863, couched in the following terms:—

The lighting of the city of Paris and of the private consumers is effected by six companies, each having a manufactory working in accordance with the conditions of the contract of Oct. 12, 1846, for a "*concession*" of seventeen years, dating from Jan. 1, 1847, and ending Dec. 31, 1863, and of which eleven years are unexpired.

At the present day, the selling price of gas per metre cube (35·3166 cubic feet) is—

1. For the public lights, 35 centimes (7s. 10d. per 1000 feet).
2. For the private lights, 44 centimes (9s. 10d. ditto).

And, according to the future proposed treaty, approved by the municipal council, subject to the ratification of the council of state, for a "*concession*" of thirty-two years, the prices are to be—

1. For the public lights, 20 centimes (4s. 6d. per 1000 feet).
2. For the private lights, 44 centimes (9s. 10d. ditto).

Considering the enormous profits realized by the companies, it is easy to demonstrate that it is possible to light—

1. The public lights for NOTHING.
2. The private lights at 30 centimes (6s. 8d. per 1000 feet).

As is evident from the following calculations:—

	Fr.	s.	d.
A ton (1000 kilogrammes) of coal costs	22	(17	3·84)
Consequently 1 hectolitre (2·75 bush.) costs	1·76	(1	4.68)
The total expense of management, manufacturing charges, and interest on capital, amounts, per hectolitre, to ..	1·31	(1	0·36)
Expense per hectolitre	3·07	(2	5·04)
Products:—			
1. 19 cubic metres of gas at the price of 44 centimes, paid by the private consumers	8 36	(6	7·2)
2. 1·30 hectolitres of coke, at 1 f.	1·30	(1	0·26)
3. Tar and ammoniacal liquor	·45	(0	4·26)
	10.11	(7	11·72)

Thus the selling price to private consumers being .. .. .. 44 centimes (9s. 10d. per 1000 feet.)

The cost price of one hectolitre of coal being 3·07f., which, divided by 19, the cubic metres of gas gives as the cost of one cubic metre .. .. 16 centimes (3s. 7d. per 1000 feet.)

Profit per cubic metre .. 28 „ 6s. 3d. „

The six Paris companies consume, on an average, 6000 hectolitres of coal per day, or per annum, 2,190,000 hectolitres, which, at the cost of 3·07f. per hectolitre, gives a total expenditure of 6,723,300f. (£264,690)

These 2,190,000 hectolitres of coal, consumed, produce—

1. 41,610,000 cubic metres of gas.
2. 2,847,000 hectolitres of coke.
3. Tar and ammoniacal liquor of the money value of 985,500f. (£38,800)

Upon the above-mentioned quantity of gas produced, (41,610,000 cubic metres), the city of Paris consumes for 14,000 lanterns at the rate of one cubic metre per lantern per diem; or, per annum, 5,110,000 cubic metres at 35 centimes 1,788,500 f. (70,410)

Sale to private consumers 36,500,000 cubic metres at 44 centimes	16,050,000 f.	(632,289)
2,847,000 hectolitres of coke, at 1f.	2,847,000 f.	(112,090)
Tar and ammoniacal liquor	985,500 f.	(38,800)
Total receipts	21,681,000 f.	(£853,580)
Deduct the expenses as above	6,723,300 f.	(264,690)
Profits of the companies ..	14,957,700 f.	(£588,890)

Exclusive of the profit arising from the repairs of lanterns and cocks, and the hire of meters.

Upon the above data, the undersigned offer to take upon themselves for thirty-two years:—

1. The public lighting of the city of Paris for NOTHING.
2. The sale of gas to private consumers at 30 centimes the cubic metre (6s. 8d. per 1000 feet.)

The following will be the results of the operation:—

		£
36,500,000 cubic metres of gas sold to private consumers at 30 centimes	10,950,000 f.	(431,100)
2,847,000 hectolitres of coke at 1 franc	2,847,000 f.	(112,090)
Tar and ammoniacal liquor	985,500 f.	(38,800)
Total receipts	14,782,500 f.	(£581,990)
Deduct expenses as before-mentioned	6,723,300 f.	(264,690)
Net profit	8,059,200 f.	(£317,300)

Exclusive of the profit arising from the repairs of lanterns and cocks, and the hire of meters.

For the erection of an establishment capable of lighting the city of Paris, a capital of 40 million francs (£1,600,000) is more than sufficient:

1. For purchasing the pipes of the present companies at the end of the existing contract.
2. To purchase a site of about 15 hectares, and there construct a model gas work, with all modern improvements and necessary dependencies.

There will still remain a sum of from eight to ten million francs for stock, working capital, and unforeseen expenses.

To ensure the due execution of the present engagement, we now offer as security the site above-mentioned, worth from 1,500,000 to 2,000,000 francs. Its position being lower than the average of Paris, will singularly facilitate the emission of gas to all the points to be lighted, and the arrival upon the spot of the necessary supplies.

In addition, a sum of 200,000 francs (£8000) shall be annually paid by us, until the day of commencing the construction of the gas works. The interest upon these payments shall belong to us.

We engage to commence the construction of the works three years before the expiration of the existing contract. (Signed) ARDOIN & Co.

Such are the precise terms of this unique proposal. Did not the character of Messrs. Ardoin and Co. stand too high to allow of such a suspicion being entertained, some might infer that they were in league with the gas companies to throw ridicule on any opposition; for a more crude or ill-digested document it has never been our lot to peruse. Leakage is set down as NIL, every foot of gas produced being accounted for by the estimated consumption. Indeed, in a subsequent document addressed to the Council of State, the startling assertion is made, "That our personal experience warrants us in sustaining, *that the loss of gas in the pipes does not exceed one or two per cent.* If, as our adversaries pretend, it was 15 or 20 per cent., that is to say, one-fifth of the production, we ask, would Paris be habitable with a daily loss of 23,000 cubic metres of illuminating gas mixed with the breathing air, when every one knows that a leak of one litre ($\frac{1}{35}$th of a foot) is sufficient to poison an entire house." What will Messrs. Ardoin say to the fact that not 15 or 20 per cent., but from 25 to 35 per cent. of the total quantity of gas produced in this metropolis is lost from the same cause, without inconvenience, to its two millions and a half of inhabitants.

The subject has been a second time discussed by the municipal council, who have confirmed their first decision, and it remains now for the Council of State to reject or ratify the treaty. *Our* Saxon principles would revolt at the bare mention of a proposal for fixing the price of one of the necessaries of life for thirty-one years to come, especially on the eve of great probable reductions in the cost of its production; and we, therefore, unhesitatingly concur with M. Chevalier in his proposal to adjourn for a few years any alteration in the present arrangements. If, for example, the system of generating water gas, and rendering it luminiferous, patented by the Messrs. Kirkham, whose specification we gave in our last number, answers the expectations entertained of it by the inventors (and we are disposed to think favourably of it), the cost of gas manufacture will be at once reduced 50 per cent. Indeed, under the present system, we have a strong impression founded on the experience of this country, that, not overlooking the high price of coals and iron in France, a uniform rate of 25 centimes per cubic metre of gas, or 5s. 7d. per 1000 feet, for all lights, both public and private, would, with the enormous consumption of 1,400,000,000 feet yearly, yield a reasonable dividend upon the capital legitimately invested in the Paris gas works, when placed under one management.

Another offer has been made by Messrs. Langlois de Semichon and Moreau to light the city with gas extracted from turf, at 2s. 3d. per 1000 feet for the public lights, and 4s. 6d. for the private, but few of the details have been made public.

SHEFFIELD GAS CONSUMERS' COMPANY.—The harmony which ought to exist between the executive body and the officials of this company appears to be at an end, Mr. G. H. Palmer, the engineer, and his staff, having been summarily and unceremoniously dismissed. Mr. Walker, the valve manufacturer, of Great Sutton-street, Clerkenwell, has been appointed, temporarily, to continue the works; but if rumour speaks the truth, and she often does, Mr. Croll is ultimately to be called in, when a favourable opportunity can be found for dismissing the secretary, Mr. Flintoff. At the present moment, the oratory and poetry of the biographer of "Angus scum of Scotia" cannot be dispensed with, and would be dangerous weapons to have to fight against.

TABLE

OF THE DISCHARGE OF GAS, IN CUBIC FEET PER HOUR, THROUGH PIPES OF VARIOUS DIAMETERS AND LENGTHS, AT DIFFERENT PRESSURES.

By Thomas G. Barlow, C.E.

(*The Specific Gravity of the Gas is estimated at* ·4, *Air being* 1.)

[Continued from p. 27.]

Diameter of Pipe, 12 in.

Length in yards	500·	750.	1000.	1250.	1500.	1750.	2000.
Quantity delivered with 0·1 in. pressure	15100·	12300·	10700·	9550·	8700·	8050·	7550·
„ 0·2 „	21400·	17400·	15100·	13450·	12300·	11350·	10700·
„ 0·3 „	26100·	21400·	19500·	16500·	15100·	14050·	13050·
„ 0·4 „	30200·	24600·	21400·	19100·	17400·	16100·	15100·
„ 0·5 „	33600·	27500·	23800·	21400·	19440·	18050·	16800·
„ 0·6 „	..	30200·	26100·	23300·	21400·	19800·	19500·
„ 0·8 „	..	..	30200·	26900·	24600·	22700·	21400·
„ 1· „	..	..	..	30200·	27500·	25450·	23800·
„ 1·5 „	..	..	..	..	33600·	31250·	29250·
„ 2· „	..	..	..	..	..	36100·	33600·

Diameter of Pipe, 14 in.

Length in yards	500.	750.	1000.	1250.	1500.	1750.	2000.
Quantity delivered with 0·1 in. pressure	22100·	18100·	15600·	13950·	12750·	11800·	11050·
„ 0·2 „	31200·	25500·	22100·	19800·	18100·	16700·	15600·
„ 0·3 „	38400·	31200·	27100·	24250·	22100·	20500·	19200·
„ 0·4 „	44200·	36200·	31200·	27900·	25500·	23600·	22100·
„ 0·5 „	49400·	40400·	35000·	31200·	28500·	26460·	24700·
„ 0·6 „	..	44200·	38400·	34300·	31200·	28900·	27100·
„ 0·8 „	..	..	44200·	39600·	36200·	33400·	31200·
„ 1· „	..	..	..	44200·	40400·	37300·	35000·
„ 1·5 „	..	..	..	..	49400·	45700·	42600·
„ 2· „	..	..	..	..	..	52920·	49400·

Diameter of Pipe, 15 in.

Length in yards	500.	750.	1000.	1250.	1500.	1750.	2000·
Quantity delivered with 0·1 in. pressure	26300·	21400·	18600·	16600·	15200·	14000·	13150·
„ 0·2 „	37200·	30400·	26300·	23500·	21400·	19900·	18600·
„ 0·3 „	45500·	37200.	32250·	28750·	26300·	24300·	22750·
„ 0·4 „	52600·	42800·	37200·	33200·	30400·	28000·	26300·
„ 0·5 „	58700·	48000·	41600·	37200·	34000·	31400·	29350·
„ 0·6 „	..	52600·	45500·	40700·	37200·	34450·	32250·
„ 0·8 „	..	..	52600·	47000·	42800·	39800·	37200·
„ 1· „	..	..	..	52600·	48000·	44400·	41600·
„ 1·5 „	..	..	..	..	58700·	54300·	50800·
„ 2· „	..	..	..	..	..	62800·	58700·

Diameter of Pipe, 16 in.

Length in yards	500.	750.	1000.	1250,	1500.	1750.	2000.
Quantity delivered with 0·1 in. pressure	31000·	25250·	21850·	19550·	17850·	16550·	15500·
„ 0·2 „	43700·	35700·	31000·	27700·	25250·	23400·	21850·
„ 0·3 „	53600·	43700·	38100·	34000·	31000·	28700·	26800·
„ 0·4 „	62000·	50500·	43700·	39100·	35700·	33100·	31000·
„ 0·5 „	69120·	56600·	49000·	43700·	39900·	37150·	34560·
„ 0·6 „	..	62000·	53600·	47900·	43700·	38100·	40700·
„ 0·8 „	..	..	62000·	55400·	50500·	46800·	43700·
„ 1· „	..	..	..	62000·	56600·	52400·	49000·
„ 1·5 „	..	..	..	..	69120·	63900·	60100·
„ 2· „	..	..	..	..	..	74300·	69120·

Diameter of Pipe, 18 in.

Length in yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 in. pressure	41400·	33800·	29400·	23900·	20700·	18400·	16900·
„ 0·2 „	58800·	47800·	41400·	33800·	29400·	26200·	23900·
„ 0·3 „	71800·	58800·	50800·	41400·	35900·	32100·	29400·
„ 0·4 „	82800·	67600·	58800·	47800·	41400·	36800·	33800·
„ 0·5 „	92600·	75700·	65600·	53500·	46300·	41400·	37850·
„ 0·6 „	..	82800·	71800·	58800·	50800·	45400·	41400·
„ 0·8 „	..	..	82800·	67600·	58800·	52300·	33800·
„ 1 „	..	..	..	75700·	65600·	58800·	53500·
„ 1·5 „	..	..	..	..	80000·	71800·	65600·
„ 2· „	..	..	..	..	..	82800·	75700·
„ 2·5 „	..	..	..	..	..	..	84500·

Diameter of Pipe, 20 in.

Length in yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 in. pressure	54000·	44000·	38250·	31200·	27000·	24200·	22000·
„ 0·2 „	76500·	62400·	54000·	44000·	38250·	34200·	31200·
„ 0·3 „	93500·	76500·	66100·	54000·	46750·	41800·	38250·
„ 0·4 „	108000·	88000·	76500·	62400·	54000·	48400·	44000·
„ 0·5 „	120500·	98800·	85300·	69800·	60250·	54000·	49400·
„ 0·6 „	..	108000·	93500·	76500·	66100·	59100·	54000·
„ 0·8 „	..	..	108000·	88000·	76500·	68400·	62400·
„ 1· „	..	..	..	98800·	85300·	76500·	69800·
„ 1·5 „	..	..	..	..	102300·	93500·	85300·
„ 2· „	..	..	..	..	..	108000·	98800·
„ 2·5 „	..	..	..	..	..	..	110200·

(*To be continued up to* 30 *inches.*)

Communicated Articles.

THE CHEMISTRY OF GAS LIGHTING.

(*Continued from page* 25, *vol.* 2.)

At this stage of our investigation into the merits of the several claimants for the privilege of using oxide of iron in the purification of coal gas, we might, without anything like dictatorial assumption, proceed at once to express our opinion concerning the subject of patent right as appertaining to one or other of those claimants. The evidence, in fact, is all before us; and, without pretending to any greater knowledge of the law than every well-educated man is supposed to possess, nothing could be easier than for us to present to the eyes of our readers the more salient points of the argument, and deduce therefrom conclusions, not only in accordance with common law, but also with common sense. In this, as in all similar occasions, we prefer, however, to lay open our most hidden sources of information, and to risk the charge of being tediously prolix, rather than incur the imputation of being learnedly obscure. Nor are there wanting other reasons for such a policy. With more than one claimant in the field, it may sometimes become a question for the managers of a gas company to know in whom the right of using oxide of iron is legally vested. If, therefore, we present in as concise a form as possible the whole history of the invention, each individual will be able to guide himself according to his own view of the case, irrespective of any opinion which we may form or express upon the subject.

We have before said, that whilst to Phillips belongs the merit of first using oxide of iron, to Croll belongs the exclusive right of using the oxides of iron in a dry-lime purifier. A most careful search has convinced us that the use of these oxides was neither published nor patented prior to the date of Croll's patent of July 29, 1840. As this patent is, therefore, the hinge upon which all argument must eventually turn, we give it beneath at full length:—

My invention consists—1. In the methods of purifying coal gas from ammonia by the application of certain salts, acids, and oxides, hereinafter described. 2. In a peculiar method of reconverting or manufacturing of the salts used in the purification of the gas, that they may be used repeatedly for the same purpose. 1. The manner of employing the salts in the purification of coal gas is as follows:—A vessel, such as is now used in the purification of gas with wet-lime, commonly called cream of lime, should be charged with a solution in the proportion of one hundred weight of chloride of manganese, or thereabouts, to 40 gallons of water, in the same manner as if wet-lime were used, and is well understood. The gas is to be passed through this solution by means of the pressure from the retorts, in the same way as through wet-lime, by which operation the gas will be freed from the ammonia which it contains and part of the sulphuretted hydrogen. It is proper here to state that after the gas has been submitted to this process it should have a further purification in order to free it from the remaining portion of sulphuretted hydrogen, which purification is to be effected by means of the oxides hereinafter described, or in the ordinary way by the use of lime. The solution of the chloride of manganese is to be immediately withdrawn from the vessel when saturated with ammonia, which saturation may be ascertained by means of a piece of litmus-paper, reddened by an acid or by any other well-known test, which paper is to be exposed to a stream of gas issuing from an aperture in a pipe after it has passed from the vessel or vessels containing the chloride of manganese; if the gas do not change the red colour of the litmus-paper to its original tint, the solution may be allowed to remain longer, until this effect upon the litmus-paper be produced, the change in the red tint indicating the saturation of the solution.

2. The same results of freeing coal-gas from ammonia may be accomplished by the use of sulphuric and muriatic acids as follows:—If sulphuric acid be employed, a vessel, similar to that one now used in the washing of coal-gas, is to be charged with water and sulphuric acid, in the proportion of one hundred gallons of water to two and a half pounds of sulphuric acid, commonly called oil of vitriol, of the specific gravity of 1·845, and this mixture is to have the gas passed through it in a similar way to that now in use in the process of washing, testing the solution of the acid mixture by litmus-paper, reddened with acid, in the same manner as in the process already described; when found saturated by the change in the colour of the litmus-paper, a further quantity of acid must be put into the washing vessel; and in order to prevent any deterioration in the illuminating power of the gas, by diminishing the quantity of carbon in the gas—which might be the case with gas of very high specific gravity, were too great a strength of acid employed—I recommend the further supply of acid by means of a reservoir of acid placed above the washing-vessel, from which a small tube descends over the mouth of a funnel, and the acid be allowed to drop or run in a small stream into this funnel, which funnel communicates by the washing-vessel by means of a small tube descending to the bottom of the vessel, and turned up again for about four or five inches, terminating with a flanch for dispersing the acid. The quantity of acid dropping or running from this reservoir can be easily regulated by drawing off a pint of the liquor, and adding to it one-sixteenth of an ounce of sesqui-carbonate of ammonia, testing this mixture with a reddened litmus-paper, as already described; and if the colour of the test be changed, the stream of the acid into the washing-vessel should be increased; but should the colour remain unchanged, the stream of acid should be somewhat lessened. This process of passing the gas through this liquor must be continued until the liquor in the washing-vessel arrives at the specific gravity of 1·170, to be ascertained by a hydrometer in the usual way, when the supply of acid to the washing-vessel is to be stopped, and the liquor retained until the whole of the acid is absorbed by the ammonia, or until no free acid remains to be ascertained by litmus-paper, as before described; after which, the liquor is to be withdrawn and evaporated in the ordinary way, to obtain the sulphate of ammonia which it contains; the washing-vessel may then be recharged as in the first instance, and the operation repeated. It is necessary to state, that the washing-vessel in this process should be lined with lead; that vessel not being acted upon by sulphuric acid, and muriatic may be employed in the same manner as to proportion, its specific gravity being 1·165 before mixed with water, for extracting the ammonia from coal-gas, and removed when the liquor is found of the specific gravity of 1·170, as in the case of sulphuric acid; but I prefer sulphuric acid. Certain other salts may be used for the same process as sulphate of manganese and muriate of iron. In some cases more than one vessel with the salts or acids may be desirable when the gas-works are very extensive. And for the proper and most effectual use of these salts and acids, but especially for the effectual use of the salts, and, in order to obtain the largest product of ammonia from the gas, my process of extracting ammonia must be used after the gas has passed the ordinary condensing apparatus, but before the gas has been deprived of its sulphuretted hydrogen by means of the oxides to be hereinafter described, or by the ordinary use of lime. To obtain the ammoniacal salts (when a salt has been used for purification), allow the insoluble matter to settle, then draw off the clear liquor which contains the salt of ammonia, and obtain that salt by evaporation in the ordinary way. If from an acid, it is only necessary to evaporate the salt of ammonia; the insoluble matter as above mentioned, as produced from the use of the salts, may be reconverted into its original state by dissolving it in the acid formerly combined with its base; or it may be dissolved in either sulphuric or muriatic acid, as it should be desired, to form a sulphate or muriate of ammonia in any subsequent operation; and the salts thus formed may be again and again used for freeing the gas from ammonia.

The third part of my improvements in the manufacturing of coal gas consists in the application of the black oxide of manganese, to remove or free coal gas of sulphuretted hydrogen, which is accomplished in the following manner: After the gas has been freed from ammonia, as above described, it is then to be passed through a vessel similar to those now in use for the purification of coal gas by what is denominated dry-lime, and charged in a similar manner with black oxide of manganese in powder, moistened with water to about the same consistency. The period required for each charge is to be ascertained and regulated by the same tests as if dry-lime were used, and which is well understood; in short, requiring no further alterations, except in the materials I employ for the absorption of the sulphuretted hydrogen. This material, after it has ceased to obsorb the sulphuretted hydrogen, is to be removed from the purifying vessel and roasted in an oven, to expel the sulphur which it then contains. After this material has become thoroughly red in the oven, I have found from two to three hours further time to be sufficient to accomplish this object, taking care that whilst it is being roasted it be well stirred about in the oven. After this operation is completed the material is fit again to be employed, by being placed in the purifyer moistened with water, as in the first instance. *The same effect may be produced by the application of the* oxide of zinc and *the oxides of iron, and treated precisely in the same way* as above described.

My peculiar mode of manufacturing, or preparing, or reproducing the salts, for the purification of coal gas, is by double decomposition with common salt, and the precipitate and the residuum that is thrown down from the chloride of manganese, in the following manner. For every twelve ounces of the dry precipitate, take one pound of common salt, or thereabouts, and, after mixing them well together, expose them for two or three hours in a heat scarcely visible in the dark, in any suitable furnace, care being taken that the heat be not increased beyond this degree, nor the materials exposed too long to this heat, which would be indicated by the formation of a green colour, or of a brown colour, in case salts of zinc were used; the mixture having by the effect of the heat become light and spongy, it is to be removed from the furnace and dissolved in water, in the proportion of one hundred and forty pounds to every forty gallons of water, and this mixture forms the solution to be placed in the purifier for the further purification of the gas from ammonia, as previously described in the employment of chloride of manganese. The gas, in passing through this solution, forms a precipitate, which is to be again treated with common salt, as in the manner above described. The liquor drawn off from the residuum in this my peculiar process being muriate of ammonia and sulphate, and sulphate of sodium, are to be separated from each other either by crystallizing the ammonia out of the salts of sodium, or by evaporating both to dryness, and subliming the muriate of ammonia from the salts of sodium, the latter being left in the subliming pot, which process is well known and understood. The precipitates formed in using any of the salts of manganese and iron above mentioned, or any of the salts of zinc (when zinc is used as previously patented by me), may be reformed in like manner, in my peculiar process above described. It will be easily seen that the form of the vessels for the purification of the gas from ammonia is not material. The form I prefer for the salts is a vessel similar to the wet-lime purifier in common use; and that for the acids, similar to the washing vessels also in common use in coal gas works, only in the latter case it is desirable that the vessels be lined with lead, as already observed.

I, therefore, do not claim any particuiar form of vessel or utensil for this purpose, but I claim the purification of coal gas from ammonia, by means of chloride and sulphate of manganese and muriate of iron, and sulphuric and muriatic acids, *and the purification of gas from sulphuretted hydrogen, by means of* the oxide of manganese, *the oxides of iron*, and the oxide of zinc, as hereinbefore mentioned and hereinbefore described, as applied in the particular manner and stage of the process of the manufacturing of coal gas hereinbefore mentioned, and not otherwise.

I also claim the peculiar mode of manufacturing or reforming all the salts, by double decomposition, as hereinbefore described.

From the above, it is obvious that Croll perfectly understood, and had practically employed, the oxides of manganese and zinc and the oxides of iron in the purification of gas; and it is also clear that he had used these oxides over again after such usage; or, in other words, that he had renovated their lost powers of purification by the employment, as he tells us, of an oven, in which the spent materials were diligently stirred about in a heated state. Moreover, he employed these oxides to purify the gas after the removal of the ammonia; so that his particular mode and period of using the oxides of manganese, zinc, and iron, are very specifically put forth, and imply the use of a dry-lime purifier, and the previous removal of the ammonia from the gas. And this is no less specifically claimed in the general summary:—"I claim the purification of gas from sulphuretted hydrogen by means of the oxide of manganese, the oxides of iron, and the oxide of zinc, as hereinbefore-mentioned and hereinbefore described, as applied to the particular manner and stage of the process of the manufacturing of illuminating coal gas as hereinbefore mentioned, and not otherwise."

Now, if there be any force in the English language, this would seem to confer upon Mr. Croll the right of purifying coal gas from sulphuretted hydrogen by means of the oxide of manganese and zinc. and the *oxides* of iron. Nor could this right be affected by any imperfection in the specification which admitted of removal by disclaimer; and still less could it be set aside by any subsequent improvement in its details. The former could easily be remedied by a well known legal process; the latter would entitle the discoverer of an improvement to no more than the extent of his beneficial improvement. It could only serve to substantiate, and not supersede, the original right vested in Croll.

But, in reality, Croll's description of his invention, as applied to the oxides of iron, is complete and perfect in itself; for, in the first place, there are two oxides of iron, or forms of oxide of iron, which exist in commerce, and are capable of purifying coal gas; these are the hydrated and the anhydrous sesquioxide of iron; and, secondly, if the roasting process described by Croll be carried out in the manner he indicates—that is, with continual stirring—it loses its sulphur, and becomes again fitted for the purification of gas. We have repeatedly tried this experiment, and with invariable success, even when the same oxide of iron has been operated upon as many as sixteen times in succession. The only circumstance that offers a cause for comment in reference to this roasting is, that with oxide of iron it is unnecessary, for mere exposure to the air for a somewhat longer period will effect something like the same object, though an accumulation of sulphur is apt to take place in this latter instance, which gives a dispositon to spontaneous combustion, and is, therefore, objectionable in gas works.

We shall have occasion hereafter to speak of the discovery of this renovating property which the oxide of iron possesses, and which has conferred upon this substance so much interest as a purifying agent. At present we desire only to discuss the main features of Mr. Croll's patent, with a view to show the extent of his claims and their validity. His claims, as we have seen, embrace the oxides of manganese and zinc, as well as iron; but in this they probably go too far, for we have not found the oxide of zinc capable of what we may call "practical renovation," and the oxide of manganese is in this respect vastly inferior to that of iron. At all events, the same treatment which renders the spent oxide of iron as useful as before, does not materially restore the activity of oxide of zinc, and has only a limited effect upon the oxide of manganese. Consequently, either the description is imperfect, or the claim incorrect, so far as relates to the sentence, "the material is fit again to be employed by being placed in the purifier, moistened with water, as in the first instance, &c." But this does not affect the claim to the primary employment of the oxides of manganese and zinc, for these undoubtedly purify gas.

We now come to the patent of Laming, dated November, 1847, and which differs from that of Croll in this respect: Croll claimed the use of the oxides of manganese, iron, and zinc, after the ammonia had been removed from the gas, "and not otherwise;" whilst Laming claimed the use of the same oxides without removing the ammonia in the first instance. In Croll's process two vessels at least were necessary, one for the ammonia, the other for the sulphuretted hydrogen. With Laming one vessel only was requisite, and hence the summary of Laming's claim ended with the words, "whereby the gas may be freed from all its ammonia and sulphuretted hydrogen in one vessel."

This patent of Laming has, latterly, been so much altered in its general aspect by a disclaimer, that the connection between it and the patent of Croll is, in great measure, lost; and, as the main object of our remarks is simply to elucidate these patents as they now stand, we shall not occupy our columns by detailing the particulars of the original specification by Laming, but briefly recapitulate the peculiarities of the amended patent. Before doing so, however, we may as well observe that, following Croll, Laming had patented the oxides of manganese, iron, and zinc; but, in place of using muriate of manganese to arrest ammonia, as claimed by Croll, Laming employed muriate of lime: and, instead of using this muriate of lime in a separate vessel, as Croll did with respect to muriate of manganese, Laming specially mixed it with the oxides of manganese, iron, or zinc, so that it could be used in one and the same vessel, according to the claim previously recited. And, to show that Laming knew of and appreciated the full force of this distinction, he expressly disclaimed the use of the above oxides when used alone, as patented by Croll; and it is a significant commentary on Croll's claim that Laming has found it necessary to reject the oxides of manganese and zinc from his amended patent.

(To be continued.)

ANALYSIS OF ILLUMINATING GASES.

By Dr. Wm. H. Ellet, New York.

The substances uniformly present in illuminating gases obtained by the destructive distillation of coal, oil, rosin, &c., are the following:—

Olifiant gas.
Hydrocarbon vapours.
Light carburetted hydrogen.
Carbonic oxide.
Hydrogen.
Nitrogen.

Traces of carbonic acid, sulphuretted hydrogen, and ammonia, are occasionally found in gases which have been imperfectly purified; but they cannot be regarded as proper constituents; and the following process does not embrace their determination:—

A. One hundred measures of the gas under examination are washed with bromine water in a Ure's eudiometer. After a few minutes the greater part of the bromine water is withdrawn and replaced by a solution of caustic potash, which removes bromine vapours. The diminution in volume is the *sum of the olifiant gas and hydrocarbon vapours.*

B. The gas remaining from (A) is washed with a solution of dichloride* of copper in hydrochloric acid. After a few minutes, the solution is replaced by water, and the residual gas freed from acid vapour by solution of potash. The absorption is due to *carbonic oxide.*

C. A measured portion of the gas remaining from (B) is transferred to another vessel, and mixed with twice its bulk of oxygen. The mixture is introduced by means of a gas syringe into the eudiometer tube, which, in the meanwhile, has been freed by a little dilute sulphuric acid from adhering alkali, and filled with mercury. The mixture is detonated by means of the electric spark. The diminution consequent upon detonation is observed. The carbonic acid produced is determined by solution of potash. Its volume is equal to that of the *light carburetted hydrogen gas,* by the combustion of which it was formed.

D. Subtract twice the volume of the light carburetted hydrogen from the total amount of diminution caused by detonation. Two-thirds of the remainder indicate the quantity of free *hydrogen.*

E. One hundred measures of the gas under examination are washed with solution of dichloride of copper in hydrochloric acid. The solution is replaced by water, and the acid vapour removed by solution of potash. The absorption indicates the *sum of the olifiant gas and of the carbonic oxide.* Deducting from this the amount of carbonic oxide obtained in (B), we have the amount of *olifiant gas.*

F. The amount of olifiant gas obtained in (E), deducted from the sum of the hydrocarbon vapours and olifiant gas obtained in (A), gives the amount of *hydrocarbon vapours.*

G. In a long and narrow glass tube, which should be minutely graduated near its closed extremity, one hundred measures of the gas under examination are mixed over water with five hundred measures of chlorine gas, whose degree of impurity has been previously determined by a solution of potash. The mixture is first exposed to diffuse daylight. When about three-fourths have been condensed, a few minutes, exposure to direct sunshine completes the condensation; the quantity of *nitrogen,* by washing the residual gas, and deducting from the remainder the amount of chlorine impurity.

* This solution should be an extemporaneous preparation. It is best made by warming, or simply agitating, a mixture of about equal parts of black oxide of copper, and the precipitated metal with hydrochloric acid. It is best to employ a large excess of acid, which prevents the precipitation of the copper salt on the contact of the solution with the water in the bend of the eudiometer. The solution readily absorbs carbonic oxide and olifiant gas, but has no action upon hydrocarbon vapours or the other constituents of illuminating gas. It also absorbs oxygen gas.

THE ROMAN GAS CONTRACT.

We have been favoured with the perusal of a copy of this contract, from which we extract the following particulars:—

The public lights are to be of two classes; the first, consuming 6 cubic feet of gas per hour, the flames being $1\frac{3}{8}$ in. high, and $2\frac{3}{4}$ in. wide, are to be paid for at the rate of $\frac{46}{100}$ths of a penny per light per hour. The second class are to consume 4 cubic feet per hour, and are to be paid for at the rate of $\frac{37}{100}$ths of a penny per light per hour. The former yield 6s. $4\frac{1}{2}$d. per 1000 feet for the gas they are to consume, and the latter 7s. $8\frac{1}{2}$d. When 4000 private lights are obtained, the above prices are to be reduced to $\frac{40}{100}$ths of a penny for the first-class lights, and $\frac{32}{100}$ths for the second class. There is no limitation to the price to be charged to private consumers, but it is stipulated that the public lights shall always be supplied at 20 per cent. less than the private ones. The proposed price for the latter is 14s. per 1000 feet.

The gas is to be manufactured from coal, and to have a specific gravity of from ·425 to ·500, at a temperature of 32 deg. Fahr., and a barometrical pressure of 30 in.

The authorities have the right to require the public lighting to be extended progressively in the inhabited part of the city, whenever there is one private light per 40 feet of main, over and above 4000 lights.

The contract grants a monopoly for the term of 25 years, at the expiration of which period the authorities have the right of purchasing the works at a valuation, should they see fit to do so.

Those who are unacquainted with Rome are not aware that during the winter months it is the favourite resort of the fashionable

world of all Europe, and that the natives habitually turn night into day, resorting to the cafés and club-houses after sunset, many of them remaining there till nearly sunrise. The demand for artificial light is consequently very considerable; and upon a survey being made a short time since, it was found that 150 palaces, large and small, 171 hotels, inns, and wine-shops, 71 chemists and druggists, 77 cafés, 15 restaurants, 7 clubs, 46 tobacconists, 321 various shops, besides numberless small ones, and numerous public edifices, would be large consumers of gas. The Anglo-Romano Gas Company, which has undertaken the supply, is under the management of two gentlemen who have had great experience in such undertakings, and enjoy the confidence of their constituents. There can, therefore, be little doubt of the success of their new undertaking.

Correspondence.

MR. LEWIS THOMPSON ON THE ILLUMINATING POWERS OF GAS IN THE METROPOLIS.

SIR,—The cause of truth has at length triumphed over the flimsy sophisms of falsehood, and I am now able to announce the final extinction of the wax candle snare. Henceforth we are to have a spermaceti standard and a wax candle deduction, but no more of Mr. Croll's 120 grains of wax with two inches of "snuff." No, that glorious and profitable source of illumination has passed away for ever; and a man might sooner hope to find the throne of Caractacus standing in the middle of Ludgate-hill, than get the hitherto-duped citizens of London to close their eyes to the significance of this waxen imposition. Dr. Letheby, after a whole twelvemonth's experience, finds it beyond his management, and, therefore, honestly comes forward with a resolution to discontinue its use, for the following reasons: first, "from irregularity in the structure of the wick; secondly, from alterations in the position of the wick; thirdly, from differences in the composition of the candle; and, fourthly, from variations in the temperature of the room." And Dr. Letheby further adds, "taking all these difficulties into consideration, and perceiving that many of them are uncontrollable, it does appear to me advisable that the standard of comparison should be changed, and that we should employ a *sperm* candle of fixed value for the wax of 120 grains per hour." This, I believe, is what may be called conceding the whole question, and sufficiently vindicates the course I have pursued in this matter. And now that I have at length fairly fixed Mr. Croll with a definite comparison, not based upon my own experiments, but upon those of one who cannot be supposed to be quite indifferent to the welfare of the Central Gas Company; now, I say, that a comparison exists which even Mr. Croll cannot object to, let us see how the argument stands as between Dr. Letheby's well-ascertained facts and the solemn oath of Mr. Croll.

I earnestly solicit attention to the serious imputation which grows out of this subject, and refer my readers to Dr. Letheby's report for the particulars of my quotations.

Dr. Letheby says, "the lowest amount of light emitted by the Argand has been equal to that of 13·5 standard wax candles, and its mean intensity during the quarter has been that of 15·9 of such candles. This, however, indicates the value of the gas when the candle has been burning at its best, or nearly so; for when the candle has been allowed to remain in an undisturbed condition for a period of fifteen or twenty minutes, its (the Argand) illuminating power has been on the average equal to 20·9 of such candles." Consequently, the relative light of the snuffed and unsnuffed wax candle is as 20·9 to 15·9, according to Dr. Letheby; and that this is his true meaning, is further confirmed by a subsequent part of the same report, where he tells us that between the snuffed and unsnuffed candle there is a difference of 25 per cent.

Again, we are told that between "the values of wax and sperm as illuminating agents, the relative values stand in the proportion of 13·8 to 15·8." Mark, then, how forcibly the argument returns. Mr. Croll, or some one for him, adopted twelve wax candles as the parliamentary standard, asserting at the same time that this exceeded the existing luminiferous power of the gas then supplied to the City of London by the City and Chartered Gas Companies, which, according to Dr. Leeson and Professor Graham, was equal to 9·1 sperm candles of 131 grains. Now, Dr. Letheby's estimate gives twelve wax unsnuffed, equal to 9·1 of the snuffed, for 20·9 : 15·9 : 12 : 9·1. Again, as wax snuffed is to sperm as 13·8 to 15·8, it follows that 9·1 is equal to 7·9 sperm, for 15·8 : 9·1 : 13·8 : 7·9. But these 7·9 sperm candles are of 120 grains each only, whereas the candle of Dr. Leeson and Professor Graham was 131 grains; consequently, we must have a further reduction, therefore 131 : 7·9 : 120 : 7·2. We have hence arrived at the real standard put forth by the cheap advocates to stultify the bewildered citizens of London, and what is the result?—why, that whereas the citizens were then enjoying gas of a quality equal to 9·1 sperm candles of 131, the Crollo-Pearsonian patriots generously gave them 7·2 of such candles! Yet Mr. Croll, in my hearing, swore on his solemn oath that he raised the standard of his gas above that prevailing in the City in the year 1849! *Credat Judeus apella.*

I charitably believe, however, that ignorance and not fraud was the parent of this fallacious standard; but, nevertheless, a lesson may be learnt from it even then. Another waxwork job is in progress as a railway terminus scheme. This should be seen to in time by the public. For my part, I say of it, with *Autolicus*, in the "Winter's Tale," "when the kite builds, look to lesser linen," and there I leave it.

In appending hereto my usual photometrical table, I have great pleasure in being able to announce that a manifest improvement has quite recently taken place in the purity of the Central gas. It is now quite free from carbonic acid, and altogether very satisfactory. The City and Chartered gases continue to maintain their established reputation.

General or Monthly Average of the Heating Power of the Gases supplied to the City of London by the Gas Companies mentioned, between the 11th of February and the 9th of March inclusive.

	Grains of Water evaporated by 1 cubic foot of Gas burnt at the rate of 10 cubic feet per hour.
CITY COMPANY.....	2900
CHARTERED COMPANY	2871
CENTRAL COMPANY.....	2839

Daily Record of Observations upon the Gases mentioned below, the specific gravity being taken by means of an air pump and flask with a delicate balance, the condensation by bromine, and the illuminating power by a spermaceti candle, burning about 120 grains per hour, but always reduced to this gravity by calculation.

Date.	CENTRAL COMPANY.			CITY COMPANY.			CHARTERED COMPANY.		
	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.
Feb. 11	·409	13·2	3·8	·408	13·5	3·8	·406	13·	3·7
12	·405	12·4	3·6	·404	12·7	3·5	·400	12·3	3·4
14	·405	12·5	3·6	·404	12·7	3·5	·402	12·6	3·5
15	·403	12·2	3·5	·403	12·5	3·5	·402	12·5	3·5
16	·407	12·8	3·6	·408	13·2	3·7	·405	13·	3·7
17	·408	13·	3·7	·408	13·1	3·7	·405	13·	3·7
18	·409	13·	3·7	·410	13·4	3·8	·405	13·	3·7
19	·401	12·2	3·5	·403	12·5	3·5	·400	12·1	3·5
21	·406	13·1	3·7	·407	13·6	3·8	·404	13·	3·7
22	·404	12·7	3·6	·405	13·	3·7	·402	12·5	3·5
23	·408	13·8	4·1	·413	15·7	4·3	·409	13·8	4·1
24	·410	13·2	3·8	·414	14·7	4·2	·413	14·2	4·2
25	·403	12·7	3·6	·409	14·	4·	·405	13·	3·7
26	·409	13·5	3·8	·407	13·8	3·9	·406	13·5	3·8
28	·406	13·2	3·7	·408	13·8	3·9	·406	13·5	3·8
Mar. 1	·408	13·2	3·7	·407	13·6	3·8	·406	13·4	3·8
2	·388	12·	3·4	·405	13·	3·7	·403	12·6	3·5
3	·405	13·2	3·7	·414	14·	3·9	·405	13·2	3·7
4	·410	13·5	3·8	·416	13·9	3·9	·406	13·5	3·8
5	·411	13·5	3·8	·416	14·1	4·	·412	14·1	4·2
7	·390	12·2	3·4	·420	14·4	4·2	·410	13·9	4·1
8	·390	12·3	3·4	·413	14·	4·	·409	13·7	4·
9	·394	12·6	3·5	·423	14·8	4·3	·413	14·1	4·2
AVERAGE	·403	12·9	3·6	·409	13·6	3·8	·405	13·2	3·7

No. 7 A, *Pancras-lane, City, March* 9, 1853. LEWIS THOMPSON, M.R.C.S., &c., Consulting Chemist.

THE BUNSEN PHOTOMETER.

SIR,—Having just seen in your valuable JOURNAL a letter from a "Constant Reader," calling in question the decision of the *Académie de Rouen*, I cannot allow it to pass without a reply, although I fear it may prove a useless waste of words.

I could never have supposed that a decision given by so well-constituted a body as the *Académie de Rouen*, could ever be suspected of ignorance, which is not the only hint of the "Constant Reader," whoever he be. But when he speaks of the "three-fourths in number not being the three-fourths of the wisdom," it will not be useless to call public attention to the names of the persons referred to, and to whom Mr. Preisser is not at the present time to be compared, at least for experience and celebrity, if for capacity; as it is, I allow, *sometimes*, the case that pupils become more clever than their masters.

The commission was composed of—

1. M. Boutan, the eminent Professor of Physical Sciences to the *Lycée Impérial de Rouen*; President of the *Académie de Rouen*.

2. M. Levy, another experienced licensed professor of physics and mathematics.

3. M. Giraud, now Professor of Mathematics to the *Lycée Impérial of Caen*.

4. And besides, M. J. Girardin, the celebrated Professor of Industrial and Chemical Philosophy; Member of the French *Académi-des Sciences* (Institut.), well known by a number of valuable works, which have earned for him the most honourable distinctions throughout Europe, the professor having assisted in all the sittings of the commission, as the *Sécrétaire perpétuel* to the Academy for the Class of Sciences.

But it is not only a majority of FOUR to ONE that M. Preisser has had to deal with, in his obstinate refusal to recal his original assertions, even after convincing proofs of its erroneousness; for the whole academy, with the exception of a few blind friends, *rari nantes*, have confirmed the judgment of the commission.

Where would be now the use of a "description," unless injurious to that judgment, which does not need a justification on my part?

I need only to say that the "Constant Reader" makes an incorrect statement, viz., that I use a diaphragm of *oiled* paper: this was precisely one of the leading improvements that were found to be mine after six months' inquest, but against M. Preisser's opinion, that is to say, that my diaphragm, although on Dr. Bunsen's principle, does away entirely with oily or fatty matters whatever.

EUGENE BUREL.

[It was our suggestion, and not our correspondent's, that it would have been more satisfactory to our English readers had M. Burel sent us a description of his photometer. It may be, that we should concur in the judgment of the Rouen *Académie des Sciences*, but experience has taught us that professors of chemistry and mathematics are not infallible on questions of photometry; and Englishmen, generally, have a habit of judging for themselves, rather than blindly trusting to the opinions of others, however high their reputation may stand.]

COSTS OF THE GAS LITIGATION IN SHEFFIELD.

SIR,—I beg to enclose you a copy of the appeal from the promoters of the Cheap Gas Movement in Sheffield, which I am afraid was not got up with that *patriotic* feeling they would lead us to suppose, but rather to gain popularity, and, probably, through private pique against the old company.

The appeal from the men of Sheffield will not, I think, be likely to produce a very large revenue from small gas companies or gas proprietaries in small towns, unless upon some more explicit statement of legal facts than the mere assertion of a circular, that had the Sheffield Consumers' Company failed, *all others* must get a special act.

The great question has really been a *Sheffield* gas question, and not by any means a *national* gas question; for, while all large towns ought to be in a position to get cheap gas, from their immense consumption, whether lighted by one or by several companies, yet there is no doubt that gas property in small towns is injured by the constant newspaper cry for cheap gas; and it would be a very difficult problem to solve clearly to a proprietor of small gas works, how he could, *beneficially to himself*, give pecuniary aid to such a cheap gas movement.

It is rather a novel and very plausible kind of appeal, and if six hundred companies *could* be induced to give the small sum of £5 each, no doubt the IRONSIDED Sheffield people would find it very convenient; and thus the pockets of the gentry, tradesmen, or working men in the town, might be proportionably relieved.

If you can find a corner in your valuable JOURNAL for the above, it would oblige

ONE OF YOUR ORIGINAL SUBSCRIBERS.

2nd March, 1853.

THE GAS QUESTION.

At a public meeting of the inhabitants of the borough of Sheffield, held in the Townhall, on Monday, the 21st of February, 1853, to take into consideration the propriety of making a Public Subscription to pay the legal expenses of the Sheffield Gas Consumers' Company, Mr. Councillor Booth in the chair; it was unanimously resolved:—

"1.—That, as it appears, after a most arduous, severe, and harassing struggle, that the Sheffield Gas Consumers' Company have hitherto pursued a perfectly legal course, it is the duty of the public to complete the measure of justice given to that company by the Court of Chancery, and to make a Public Subscription to pay the expenses to which they have been put, in defending their rights against the unscrupulous attacks of the United Gas Company.

"2.—That a committee, consisting of Messrs. Alderman Schofield, Councillors Ironside, Harvey, Booth, C. Thomson, and Mr. Lister, be appointed, with power to carry the foregoing resolution into effect in the best manner they may deem advisable.

"3.—That the committee make a respectful application to each gas company in the country which is not incorporated by special act of Parliament, for a contribution towards the expenses.

"4.—That a working man's committee, consisting of Messrs. John Elliott, John Sykes, Joseph Nadin, Thomas Glaves, George Cartledge, and Samuel Ellis, with power to add to their number, be appointed to assist and co-operate in carrying out the objects of this meeting.

"5.—That the cordial thanks of the meeting be given to the editor of the *Sheffield Free Press*, for his able advocacy of the Gas Consumers' Company, and for the faithful reports of the proceedings in the Court of Chancery which have appeared in that journal.

"ABRAHAM BOOTH, Chairman."

In calling your attention to the third resolution, the committee (appointed by the previous resolution) deem it necessary to give you a brief statement of the facts. In consequence of the refusal of the Sheffield United Gas Company to accede to the reasonable requests of the public, it was determined to establish another company under the provisions of the Joint Stock Companies' Act. This was done, and the most fierce, violent, and continued opposition has been brought to bear upon the new company by the old. In August last they applied to Chancery for an injunction against the new company, but Vice-Chancellor Turner refused it with costs. They then withdrew that bill, and filed another in the name of the Attorney-General. They then made application for another injunction, which was refused without costs. Upon this they appealed to the Lords Justices, who, after a full hearing, again refused the application, but without costs. In December last they made a fourth application to the Court of Chancery. Vice-Chancellor Turner heard the case in part, but the change in the Ministry taking place, he was made one of the Lords Justices, and did not finish the hearing. It was then fully heard before the Lords Justices, and occupied several days. As they could not agree, the case was again heard before them, together with the Lord Chancellor. It occupied the court three days, and ultimately the clear judgment of the court was given in favour of the legality of the new company being sufficiently established under the provisions of the Joint Stock Companies' Act. The information and bill of the old company were dismissed, but their lordships again made no order as to the costs, which must of necessity be very enormous. In addition to these expenses, the old company have harassed the new company in every possible way, by summonses under the Highway Act, indictments, actions, &c. These circumstances have induced the steps to be taken which are recorded in the foregoing resolutions. During the discussion of the case in Chancery, Mr. Daniel, the able counsel for the new company, adduced the fact that upwards of 600 gas companies were established without a special act, and put the case as a strong one on that point alone. The court said that was a very important point, and one which they would well consider. If the court had granted the injunction prayed for, all gas companies carrying on business without having a special act of Parliament, would have been compelled to obtain one. As their battle has been well fought in this case, it has been considered proper to make an appeal to them to assist in defraying the expenses.

In conclusion, the committee would respectfully intimate, that a minimum subscription of £5 from each company would be sufficient for the purpose, and would be such a trifle as would not be felt, but would be cheerfully paid by the several companies.

Signed, on behalf of the Committee,

Sheffield, Feb. 24, 1853. ISAAC SCHOFIELD, Chairman.

N.B. All subscriptions to be sent to the secretary of the committee, Mr. Isaac Ironside, Bank-buildings.

CLAY RETORTS.

SIR,—As information is sometimes asked for in the JOURNAL, as to the working of small gas works, I have thought fit to send you the following results of our working for the quarter ending the 15th of February last. If you think it will be of use to any of your readers, you are at liberty to publish it, using my name; so that, if (as in the case of the Strabane accounts) any of your readers should doubt the accuracy of the statement, they may be referred to me.

As I once mentioned in a previous communication, we work two retorts of fire-clay, one of which was new, and the other old, at the commencement of the season. The length of each retort, inside, is 5 ft. 6 in., width 20 in., and height 12 in. The furnace of the one is 9 in., and that of the other 12 in. wide, over the bars, and 20 in. long. From these retorts we have *sold, as registered on the consumers' meters*, rather over 908,700 cubic feet, or 454,350 feet from each retort; giving an average on the quarter of nearly 5000 cubic feet per retort per day. In mid winter we made more than 14,000 feet from the two retorts in the 24 hours, and could have turned out much more on the quarter, as at the beginning and at the end of it we were never fully employed. Indeed, we have made much more, as the gas used in the works, manager's house, and office, and the private lamps, which are only charged once a year, are not included in the above.

It may be interesting to know what amount of purifying surface we have in a small work for passing that quantity of gas through. We have three wet-lime purifyers, circular in form, each four feet in diameter, and two feet deep; and, from the excellent quality of our lime, they are quite sufficient. In winter two of them are run off every day, and refilled with three pailsful of lime each, mixed with water in sufficient quantity to fill them up to the proper level.

Gas Works, Haddington, JAMES ROBB.

March 7, 1853.

[We will gladly engrave any drawing the writer may send us of his setting of retorts, which may be useful to other small gas-works.]

Register of New Patents.

RICHARD LAMING, of Millwall, Middlesex, chemist, for "*Improvements in the manufacture and burning of gas, in the treatment of residual products of such manufacture, and of the distillation of coal, or similar substances, and of the coking of coal.*" Patent dated Aug. 12, 1852.

Brick ovens are sometimes used for the purpose of lessening the cost of manufacturing coal gas, by producing, at the same time, a coke sufficiently dense for locomotive and foundry furnaces. Part of this invention consists in building such ovens in close cases of sheet iron, furnished with such openings as are necessary, and which are either fitted with doors, or put into communication with the passages for the gas, as is the case with ovens constructed without the iron cases. The cases are made of any form and dimensions that may be desirable, and more than one oven may be built within a case if required. By this improvement, the gas is not so liable to become contaminated with atmospheric air as when the ordinary construction of ovens is employed in the manufacture.

I claim, under this part of my invention, enclosing ovens, wherein coal gas and heavy coke are simultaneously produced in cases of sheet iron.

Inflammable gases are sometimes made by decomposing steam—by bringing it into contact with highly heated iron, or other substances known to be suitable for that purpose; and in certain processes used in that manufacture the steam is made to pass at a red heat through pipes made of iron, and which, in consequence, become rapidly destroyed. Part of this invention consists in conveying the red-hot steam intended to be decomposed into gases, through pipes made of or lined with platinum, which is almost indestructible under such circumstances.

I claim the use of platinum channels or pipes for conveying superheated steam to materials destined to decompose it into gases for giving heat or light by their combustion, either alone or when combined with gases derived from other sources.

There is a certain residual product of the purification of coal gas which contains sulphur mixed with certain compounds of iron, and generally also of calcium, and with ammonia and vegetable or carbonaceous matter. Part of this invention consists in converting such residue into a substance proper for purifying gas, and in obtaining from it, at the same time, vapours of sulphur, which I apply to useful purposes. I proceed as follows:—I expose the residue to the atmosphere on an iron plate, or a hearth heated by a fire or a flue constructed beneath it, until the sulphur contained in the residue burns with its characteristic blue flame. I then, by means of a damper, protect the residue from any further elevation of temperature, and I stir it until the sulphur has almost entirely burned away. When this has taken place, I either quench the hot residue by the application thereto of steam or water, or I enable any carbon which it may still contain to burn slowly away by exposing the residue in a heap to the air. The resulting mass, which consists chiefly of oxide of iron, when somewhat damp, is fitted for the purification of coal gas from its sulphuretted hydrogen; for which purpose I again use it in what are called dry-lime purifiers, in the manner publicly practised with oxide of iron, or as hereinafter described with respect to the said oxide. I prefer to stir the mass while the sulphur is burning off, by machinery driven by steam power; and I enclose the machinery under a cover fixed over the plate or hearth, and made with two apertures—one for admitting air to the burning sulphur and charging and discharging the apparatus; and another, by which the sulphurous acid which is formed may be conveyed out from the apparatus. By means of a chimney draught, or a pumping or forcing machine, I cause a current of atmospheric air to sweep over the heated residue on the plate or hearth, and finally to pass, together with the sulphurous acid which is formed, into covered vessels, partly filled with raw or distilled gas liquor, or containing ammonia, its carbonate, or its hydrosulphate, dissolved in water or otherwise, or else one or more of the corresponding compounds of the oxides of sodium or potassium. The sulphurous acid becoming absorbed, there results in the said vessels a sulphite or hyposulphite, or both, or a solution of sulphur in a sulphite of the particular alkaline base employed, the incondensable gases being allowed a means of escape.

I claim, under this part of my invention, the regeneration of the aforesaid spent purifying materials by burning off sulphur in the way described, that is to say, with no more heat than is requisite to cause it to burn, and with stirring, to keep down the temperature, and also the use of the aforesaid chemical reagents, or either of them, for absorbing the sulphurous acid which results from burning the sulphur in the aforesaid spent materials, either in the way described or by otherwise exposing them to heat with access of air.

Part of this invention consists in obtaining from the residual products of the purification of gas above referred to, crude sulphur and oxide of iron, either mixed together or separate. My process is as follows:—I put the said residue into a pug-mill or other suitable apparatus, and agitate it with water until its finer parts become suspended, when I run the whole out upon a metallic cloth or sieve just fine enough to arrest everything larger than ordinary sawdust, having first placed below the first sieve a second one made of wire gauze, and of a fineness similar to that in common use for blinds, and which serves to retain everything but the liquid itself, and such impalpable powders as it holds in suspension. The liquid being left at rest, oxide of iron and sulphur, mixed, perhaps, with other matters, become deposited; when this has taken place, the liquid is drawn off, and the sediment first placed on a filter to drain, and afterwards dried either in the air or by artificial heat. Sometimes I separate the sulphur from the above deposit, and also from the residual product of the purification of gas above referred to, by exposing the substances respectively in any suitable vessel to a current of superheated steam (a temperature of about 300° answers the purpose), by which the sulphur is carried off to be received with it in water, from which it may afterwards be recovered by subsidence: the steam leaves the iron behind in a condition conducive to its subsequent usefulness for purifying gas, either immediately or after a short exposure in a moistened state to the atmosphere.

I claim, under this part of my invention, the process I have described for recovering oxide of iron which has been used for the purification of gas, together with the sulphur which it has extracted from the gas; and also the use of superheated steam for separating the said sulphur from the said oxide.

Part of this invention consists in purifying gas from its sulphuretted hydrogen by means of mixtures containing oxide of iron without the necessary formation of sulphuret of iron, which is consequent on the ordinary mode of working. Oxide of iron is in a very good condition for the above purpose after it has been exposed for a few minutes in a hydrated state to a low red heat; but it may be used in the hydrated state itself, as well as in certain other conditions of minute disintegration, not well understood by chemists. It may be mixed with a diversity of materials which do not seem to impair its action; and the oxide of iron recovered by the means above recited may be used. The oxide may generally be known to be in a proper condition for carrying out this part of my invention, when, on exposing a grain or two of it while in the presence of atmospheric air to a small current of sulphuretted hydrogen, the oxide is observed to become red hot, the sulphur at the same time separating from the hydrogen, and ascending in a visible state. Having in possession a sufficient quantity of the oxide in a proper state of efficiency, I take care that it is mixed with an adequate proportion of sawdust or other unobjectionable matter, to ensure the gas a free passage through it when in a damp state. I then place it in layers, a few inches thick, on one or more shelves of what are called dry-lime purifiers, and cause the gas to pass into the purifiers, having first mixed with the gas a volume of oxygen gas equal to the volume of sulphuretted hydrogen by which it is contaminated; the proper productions may be measured by means of two vessels similar to the ordinary gas meters, both turning on the same axis, the capacity of one of them being to that of the other as the volume of oxygen gas to be introduced is to the volume of gas to be purified. The action of the oxide of iron under these circumstances is very remarkable, the oxide for the most part seeming never to be changed into a sulphuret by the gas which it purifies; but, without ceasing to be oxide, causing the sulphuretted hydrogen and the oxygen in the gas to react upon each other as they rise to its surface, setting free the sulphur to become mechanically deposited. This peculiar action permits the process of purification by a given quantity of oxide of iron to be continued until the material has become so impervious to the gas, in consequence of the large quantity of sulphur deposited in it, as to make its longer employment objectionable.

I claim, under this part of my invention, the purification of gas from its sulphuretted hydrogen by the united agencies of oxide of iron and oxygen gas.

In connection with the foregoing part of my invention, I claim also the application of the following process for obtaining oxygen gas to be mixed with the gas to be purified. I have found that when artificial peroxide of manganese is reduced by heat to a lower state of oxidation, it recovers more or less of its oxygen on being exposed at about a low red heat to the atmosphere, which is a property not possessed by native peroxide of manganese. My process for obtaining oxygen gas to be used in the gas purifiers consists in first exposing artificial peroxide of manganese in a retort to a temperature great enough to drive off a portion of its oxygen, and then to expose it at a lower heat to the air until oxygen has become again reabsorbed, when it may be again usefully heated in the retort, and thus used many times in succession.

Another part of this invention is to render it less frequently necessary to open the vessels wherein gas is purified from its sulphuretted hydrogen by the agency of oxide of iron and oxygen gas, or of oxide of iron and atmospheric air. It is as follows:—I spread the purifying material which contains the oxide of iron in two or more horizontal layers, each a few inches thick, and occupying the whole area of the purifying vessel, and I cause the gas to enter the vessel below the undermost layer, passing through each layer in succession, to escape from the vessel at some point above the uppermost layer. It follows from this arrangement that all or nearly all of the sulphur separated from the gas becomes deposited in the lowest layer, eventually impeding the free passage of the gas through it before the other and higher layers have done much service. When the resistance to the passage of the gas has become inconveniently great, I cause a hole, at least equal in area to the orifice of the inlet-pipe, to be opened through the lowermost layer of material, which I do either by sliding away or turning into a vertical position a portion of the sieves upon which the purifying material rests, and which I effect by means of a rod passing air-tight through the side of the vessel. The second layer in succession, being thus made the first through which the impure gas has to pass, becomes, in its turn, gradually choked with sulphur, and eventually requires to have a similar hole opened through it; and thus onward with all the several layers in succession except the last, when, instead of opening a hole, the vessel will need to be recharged with fresh material.

I claim, under this part of my invention, the means I have described for throwing out of action successive layers of purifying material, as they are made inconveniently impervious to the gas by the deposition of its sulphur, caused by the reaction of its sulphuretted hydrogen, on oxide of iron, in conjunction with oxygen gas or atmospheric air.

Another part of this invention refers to a means of supplying heated air for the combustion of gas for illumination. My apparatus consists of a vertical argand burner with two glass holders adjusted concentrically to it, and sliding up and down upon it, as in the case of the single glass holder of the Carcel lamps. The two glass holders are of unequal diameters, and the smaller one is placed about half an inch above the larger one, the two being so connected together by a tube surrounding the burner, as that both may be made to slide up and

down together. Each of the holders carries a glass, which is either of a cylindrical shape, or of some other ordinary form, the inner glass being the taller of the two. The floor of the lower glass holder is a solid flat ring, and the floor of the upper glass holder is made as pervious to air as possible. The two concentric glasses are in no part distant from each other less than about half an inch, and the whole apparatus is so contrived as to cause all the air which supports combustion to arrive at the flame by first descending the channel formed between the two concentric glasses. There is no opening by which the air may enter the burner from below as in ordinary cases. Part of the air, when it has arrived at the bottom of the channel above named, turns under the edge of the inner glass, and then ascending within it, that part acts on the external surface of the flame, while another portion of the air passes to the inner surface of the flame through lateral circular openings in the tube which connects the two glass holders together, and which slides upon the burner, and also through long vertical openings made through the sides of the burner itself. These longitudinal openings allow the glass holders to slide up and down without closing any part of the smaller circular openings, and being made to correspond in width, number, and position with the circular openings, these may become partially closed whenever the glass holders are turned round upon the burner. The elevated temperature acquired by the air as it is thus made to approach the flame, greatly improves the intensity of its light, but it is apt to cause the inner glass to become fused; I avoid such an accident by excluding lead from the materials of which the inner glass is made. In applying this apparatus to obtain the most perfect combustion of a given quantity of gas, I simply raise or lower the adjustible glass holders, turning them round a little when necessary, until they have attained their most favourable position for effecting the desired object, which is indicated by the increased brilliancy of the light.

I claim, under this part of my invention, the combination of the two concentric glasses (one of them without lead in its composition), by which the air may be heated as it arrives to support combustion, and also the arrangement of adjustible glass holders, and the holes by means of which the supply of the heated air may be augmented or diminished at pleasure.

Another part of this invention has reference to a new combination of processes for converting into sulphate of ammonia the ammoniacal products resulting from the operations of gas works, from the distillation of coal, or other similar substances, and from the coking of coal. For this purpose, I first convert the said ammoniacal products by any known means into ammonia, or the carbonate of that base, and I next submit either or both of these reagents to the action of sulphurous acid, obtained in a gaseous or fluid form by any known means; and lastly, I expose the sulphite of ammonia which thence results to the simultaneous influences of air and water, by which it is rapidly converted into a solution of sulphate of ammonia, which may be evaporated and crystallised in the usual way. The means which I prefer for converting the ammonia, or carbonate of ammonia, into the sulphite of that base, is to pass sulphurous acid in a gaseous form over the ammonia, or its carbonate, in solution contained on the floors of long and shallow leaden chambers; and I take care that no notable quantity of hydro-sulphate of ammonia be present, as the presence of that reagent would be injurious to the sulphate of ammonia in the subsequent processes of evaporation and crystallisation.

I claim, under this part of my invention, the manufacture of sulphate of ammonia, from the ammoniacal products above referred to, by the combination of processes above recited.

The last part of this invention refers to the manufacture of sulphate of alumina and alum. I burn the coke of Boghead, or other coal of like nature, in the open air to reduce it to a white ash, taking care that the ignited coke never lies in heaps of more than a few inches thick, and that its temperature never rises from any cause high enough to fuse together the alumina and the silica with which this kind of coke abounds. I then lixiviate the white ash thus made (or obtained in any other manner) in leaden vessels, with repeated doses of hot sulphuric acid (the strength may be about 70 or 80 per cent.), until the ash is nearly exhausted of alumina; the solutions thus obtained, I again heat, and with them lixiviate one or more other portions of fresh ash, withdrawing each dose of the acid as it acquires its maximum quantity of alumina. The iron with which the solution of alumina is contaminated may be removed by any ordinary means. The solution is then to be concentrated by evaporation, or the sulphate of alumina may be made into alum in the usual way. Sometimes, instead of first reducing the coke to a white ash, I lixiviate the coke itself in the manner I have described.

I claim the extraction of the alumina from the coke, or the ash of Boghead, or similar coals, by hot sulphuric acid, and also the treatment of the coke of Boghead, or similar coals, as above described, for reducing it to a friable ash.

Legal Intelligence.

LORD CHANCELLOR'S COURT—Lincoln's Inn.

Wednesday, Feb. 16, 1853.

(Before the Lord Chancellor, and Lord Justices Sir J. Knight Bruce and Sir G. Turner.)

THE ATTORNEY-GENERAL AT THE RELATION OF E. UNWIN, INFORMANT. THE SHEFFIELD UNITED GAS-LIGHT COMPANY, PLAINTIFFS; AND THE SHEFFIELD GAS CONSUMERS' COMPANY, DEFENDANTS.

This cause came on for re-argument on the 11th, 12th, and 16th ult., before the Lord Chancellor and Lords Justices of Appeal, in consequence of a difference of opinion between the latter as to the judgment to be pronounced. Mr. Rolt stated the case at great length for the informant and plaintiffs. The answer of Mr. Daniel occupied six hours; and, after a brief reply from Mr. Rolt, their lordships delivered the following judgments *seriatim*:—

Lord Justice Turner: This is an information and bill filed by her Majesty's Attorney-General at the relation of Edwin Unwin, who is the secretary or manager of the Sheffield United Gas Light Company, and a bill by the Sheffield United Gas Light Company, against the Sheffield Gas Consumers' Company, for the purpose of obtaining a perpetual injunction to restrain the Sheffield Gas Consumers' Company from laying down any gas mains or pipes or other works, in or under the streets or highways of the borough of Sheffield, or any part of them, and from breaking up or disturbing for that purpose the road or pavement of the said streets or highways, or any of them, and from doing any other act whereby the passage of her Majesty's subjects along the said streets or highways, or any of them, shall be in any respect obstructed or rendered less safe or convenient, or whereby the gas mains or pipes or other works of the plaintiffs may be in any way injured or damaged. The general outline of the facts, without entering into the particular details of the case, appear to be these:—That there existed from the year 1818 up to the year 1836, in Sheffield, one gas company, that company being incorporated by act of Parliament; that in the year 1836 another company was formed, which continued to supply the town of Sheffield with gas, with the original company, down to the year 1844; that in the year 1844 an amalgamation of those two companies took place; that in the year 1851, about the autumn of that year, the constitution of the defendants, the Sheffield Gas Consumers' Company, was taken into consideration, and that company was begun to be formed; that somewhere about March, 1852, the Sheffield Gas Consumers' Company was duly registered under the provisions of the Joint-Stock Companies' Act; and that thereupon, in the month of April, 1852, a bill was filed by the present plaintiffs, the Sheffield United Gas Light Company, against the Sheffield Gas Consumers' Company, for the purpose of restraining them from laying down their pipes. At that time no pipes had been laid down by the defendants, the Sheffield Gas Consumers' Company, and the case, therefore, which then came before the court was a case of entirely anticipated mischief. That case was fully heard before me, as Vice-Chancellor, and upon the hearing of that case judgment, I think, was given on the 24th of May, 1852. Upon the hearing of that case I was of opinion that the plaintiffs had not succeeded in making out so clear a case of anticipated mischief as would warrant the court in interfering to grant an injunction. From the month of May, 1852, nothing further took place till the month of July following, at which time the present information and bill was filed, and upon that an application was again made to me as Vice-Chancellor for an injunction on the part both of the Attorney-General and of the plaintiffs. That motion shared the same fate as the preceding one. I thought that the plaintiffs had not then made out a case entitling them to an information against the defendants. My opinion on that subject not being satisfactory to the parties, the case was carried up to the Lords Justices, and on the 6th of August, 1852, the Lords Justices also thought proper to refuse that motion. It appears that the company had begun in the month of October, 1852, to lay down their pipes, and thereupon, in the month of November, according to the present notice of motion, they having begun to lay down their pipes, a further notice of motion was given before the Lords Justices in December for the present injunction. Upon that motion coming on it was considered that it would be better for both parties that the cause should be heard. Accordingly the cause was to come on for hearing upon the affidavits, and it now stands before us for consideration of what is right to be done upon the motion for the injunction and the hearing of the cause. Now, the first question that seems to me to be of importance in the present case is, the general principle on which this court interferes in cases of this description; and I take that principle to be the inadequacy of the remedy which the law gives in cases of nuisance. Now, that was distinctly laid down by Lord Eldon in the case of the Attorney-General *v.* Nichol, in 16 Vesey. Lord Eldon there says, addressing himself to the interference of the court in cases of this nature—"The foundation of this jurisdiction—the interfering by injunction—is that head of mischief alluded to by Lord Hardwicke—that sort of natural injury to the comfort of the existence of those who dwell in the neighbouring houses—requiring the application of a power to prevent as well as remedy an evil for which damages more or less would be given in an action at law. The position of the building, whether opposite, at right angles, or oblique, is not material. The question is, whether the effect is such an obstruction as the party has no right to erect, and cannot erect without those mischievous consequences which upon equitable principles should be not only compensated by damages but prevented by injunction." It is clear, therefore, that Lord Eldon's opinion in that case refers to the jurisdiction of the court, to the extent of the injury, and to the preventive power of this court, as superior to the remedy which can be obtained at law for any injury which may be done. Now, it is said that however that may be in a case of private nuisance, which was the case to which Lord Eldon was addressing himself in the case of Attorney-General *v.* Nichol, that it must be different in the case of a public nuisance, and that it is the duty of this court to interfere in all cases of public nuisance. And that argument is enforced by this—that it is said, if the injury be trifling—if the inconvenience be trifling—it will not be a nuisance at law, and, therefore, that the interference of this court must take place whenever it is a nuisance at law, because the very fact of its being a nuisance at law imports that the injury is great and the inconvenience consequent. But I confess that, looking at the principles on which, as I apprehend, this court interferes, it does not appear to me that there can be any sound distinction between the case of a private nuisance and the case of a public nuisance. It is not on the ground of any criminal offence committed, or for the purpose of giving a better remedy in the case of a criminal offence, that this court is or can be called on to interfere, but it is on the ground of injury to property that the jurisdiction of this court must rest. And, taking it to be on the ground of injury to property, the only distinction which seems to me to exist between

public nuisance and private nuisance is this—that in cases of private nuisance it is injury to individual property, and in cases of public nuisance it is an injury to the property of mankind. I think, therefore, the same principle must guide the interference of the court whether it is the case of private nuisance or public nuisance. And that principle is this: whether the extent of the damage and of the injury be such as that the law will not afford an adequate and sufficient remedy for that injury. It seems to me that the same principle which regulates the court in those cases, and in which its jurisdiction is more generally applied, applies generally to the present. For instance, in the case of specific performance the jurisdiction of this court is founded on the inadequacy of the remedy at law. In the case of specific performance of a covenant, it is not every covenant which this court will perform, but it is those cases of covenant in which the performance of the covenant is essential. So, again, it is admitted to be in the case of trespass, and so I take it to be in the case of nuisance. The question, therefore, which we have to consider in this case appears to me to be, whether this is a case in which the remedy at law is so inadequate that the court ought to interfere under the circumstances of the case, having regard to the legal remedy and rights and interests of the parties, and the consequences of its interference. Now, this case is a mixed case partly of public injury and partly of private injury, and in considering it I think it is important to separate the two questions of public injury and of private injury. Now, the injury to the public which is complained of here, and of which the Attorney-General makes complaint, arises from their interests in the streets of Sheffield; and it is said that the streets of Sheffield will be materially impeded by the laying down of the pipes of this company, and by the continual taking up of those pipes which will be necessary for the purpose of repairing them when they have been once laid down. Now, as to the laying down the pipes, that appears to me to be a case merely of temporary inconvenience. At the utmost, according to the evidence as it stands before us, it is a case of two or three days. I think that in the case of Neepsend-lane it was proved that there was an interruption of five or six days; but in that case it was proved also that at that period a negotiation was pending either between the two courts or between the municipal authorities of Sheffield and the defendants' company, which prevented the completion of the works there within the period at which they would according to the ordinary course have been completed. It seems to me, therefore, that that interruption is an interruption which is merely partial and quite temporary. But when these pipes are laid down, the work which has been done is entirely completed; it is done once for all. And if this court is to interfere on the ground that it will be an inconvenience arising from the laying down of these pipes which will occasion a temporary obstruction for two or three days, I am at a loss to see how the interference of this court could be withheld in the case which has been put in the course of the argument of hoards erected in the public streets where houses are under repair, or in the case of making cellars in the public streets, or in the case of obstructing the pavement of the public streets by depositing goods on them. All these are nuisances in a greater or a less degree; and if the court is to interfere on the ground that the pavement of Sheffield will be taken up for two days for the purpose of laying down the pipes of this company, it seems to me that it will be equally bound to interfere in the cases to which I have referred. And, with reference to what has been said as to the continual taking up of the pavement which would be consequent on these pipes having been laid down, it is true that there may be, and probably will be, some inconvenience resulting from that; but it is an inconvenience which will not affect the general body of the inhabitants of Sheffield. It is an inconvenience which may occur from time to time probably to a much less degree than is anticipated by the parties. I speak with reference to the strength of the case which was made when the application to the court was first made—the difference between that and the case as it now stands. I think that inconvenience will be temporary, applying only to a particular part of the town, not affecting the general body of the inhabitants to any extent which will render it inconvenient. Now, it is not to be left out of consideration, in determining this question, that to some extent the law has provided a remedy in respect of these inconveniences. There is some remedy under the Highway Act; and there are boards of surveyors here having control of the streets who concur in these measures being taken; and, as to any injury which any private idividual may sustain, the law is open to him by an action on the case. Now, with reference to the second head of the argument, as to a private nuisance, it was said that there would be great injury to individuals by reason of the defendants, on laying down their pipes, acquiring an easement in that property which belongs to individuals. But this seems to me to be a private injury to each individual, and not a nuisance to all the individuals; and, if treated as a private injury to each individual, I think it is not a case in which this court will interfere, because, if considered as a case of a nuisance to a private individual, it is an injury of which some one individual in the streets would probably approve, and another disapprove. It is evident from the affidavits in the present case that there are many of the inhabitants of Sheffield who would be, and are, no doubt, willing and desirous that these pipes should be laid down before their houses, although others might be desirous that it should not be done. It cannot, therefore, be brought in as a case of common injury to all; and as a case of private injury to each, it does not seem to me to be open on the present record. Now, something has been said in the course of the argument of the danger to the public peace which may ensue from the non-interference of this court; but I think that this court cannot suppose there is an inadequacy of the civil power to preserve the public peace. I say nothing on the question of whose fault it is, if there will be this disturbance of the public peace. It is true, as stated by the plaintiffs in their argument, that, if they leave the defendants alone, the probability is that there will be no disturbance at all take place; but they say that they are justified in disturbing them, as it is the only means by which they can prevent these illegal acts from being done. But I think that it is not competent to come to this court and say that the inadequacy of the law to give them a remedy gives them a right to do the acts which occasion a breach of the peace. The argument seems to me to go too far, for it would apply to any case of an illegal act—to any nuisance or trespass, however trivial; for each and every of these nuisances and trespasses might in the result lead to a breach of the public peace. Now, some observations have been made, with reference to which it may be necessary for me to say a word or two with reference to the question of delay in the present case. I perfectly agree with the argument which has been urged on the part of the plaintiffs; as so far as they, individually as plaintiffs, are concerned, it is impossible on this record to impute to them any ground of delay. But, with reference to this proceeding, so far as it is a proceeding by the Attorney-General, I do not concur in the argument urged on the part of the plaintiffs, that there is no ground for imputing delay to the Attorney-General, or that delay can have no influence on such a question as the present. In truth, the case as to the Attorney-General stands thus:—The works of this company were begun in October, 1851, and it is not till July, 1852, that the Attorney-General takes any proceeding to restrain the execution of those works. In the mean time the company have been laying pipes from October, 1852. They had also entered into contracts. And they had been allowed to take these proceedings without any interference on the part of the Attorney-General. That the delay will affect the Attorney-General as much as a private individual I am not prepared to say; but it is a circumstance to be considered in determining the question whether this court shall interfere, although the application to the court be on behalf of the Attorney-General. I have no hesitation in saying that in my opinion it is, and I ground myself in that opinion upon what is said by Lord Eldon, in the case of the Attorney-General v. Johnson, in 2 Wilson, where he distinctly stated his opinion that that is a question which is to be considered in determining a question of jurisdiction, though the application be on behalf of the Attorney-General. I think, therefore, that the case fails so far as the public are concerned. The question then remains of the private right of the plaintiffs. The question here is, what is the injury to the plaintiffs in their character of a joint-stock company (a company incorporated by act of Parliament) beyond that which the public sustain. It is said that there is damage to their pipes. If so, there is a remedy in an action on the case. And I think there is great weight in the argument used on the part of the defendants, that these plaintiffs, having acquired a right to lay their pipes, are in truth seeking through the medium of that right a higher and a better right—a right to preclude others from laying down their pipes. But I do not think that there is any case established of damage to the pipes of the plaintiffs sufficient to justify the interference of this court on the ground of private nuisance. And I have been throughout this case very much struck with the great strength of the affidavits made on the first application as to the anticipated nuisance—the enormous inconveniences which were then anticipated as likely to result to the plaintiffs from the defendants being permitted to lay down their pipes at all—and what in my opinion is the very different aspect of the case on the affidavits as they now stand, showing that the injuries anticipated in April, 1852, and so strongly deposed to on that occasion, have not been realised by the affidavits filed on the present occasion, when it is in evidence that six miles of the pipes of the defendants have been already laid down in the streets of Sheffield, and it is said that eight more have been laid, making fourteen altogether during the pending of the present matter. Another view which strikes me with reference to the interference of this court in cases of this description is this: the parties are here coming into equity on purely equitable grounds, and on a case where there may be some possible doubt of the result of the proceeding at law. I take it that in a case of that description the ordinary course of this court would be to allow the proceedings at law to go on, in order that the court may be in a position to see what the result of those proceedings would be. It is upon an equity founded on a legal right that the plaintiffs come, and for an extension of the legal remedy. It is first to be seen to what extent there is the alleged mischief before this court would interfere. The effect of the interference of this court would be to prevent, in truth, the legal question being tried at all. Now, upon these grounds, therefore, and on looking, which I have done carefully, through the affidavits in this case, being satisfied that there is not that extent of mischief which in my opinion would justify the interference of this court, the conclusion that I have arrived at is that this information ought to be dismissed also. I think it should be without costs, but in my opinion it should be dismissed. And, if it shall eventually appear that there is any such excessive mischief as is contemplated on the part of the plaintiffs, it will be quite open to them, notwithstanding the dismissal of the bill, to file a fresh information or bill, and make a new case upon new facts; but upon the facts as they at present stand my opinion is that this information and bill ought to be dismissed.

Lord Justice KNIGHT BRUCE: In making the order of the 6th of August last the Lords Justices intended it certainly to be without prejudice to any question, and particularly meant that it should not hamper or interfere with the judicial discretion of the court as to the mode of dealing with the suit at the hearing. If that intention or that meaning is not clearly expressed in the order as drawn up, it has not been drawn up as it ought to have been. I believe, however, that by neither side has it been misunderstood in this respect. My impression is that the order, intended and understood as I have mentioned, having been made merely upon an interlocutory application on the state of facts and circumstances which then existed, was not an erroneous or incorrect order. If, however, the question is asked whether I now consider that in disposing of the motion, so far as I was concerned, I expressed myself with sufficient fulness and altogether correctly, I must own that I have more misgivings as to the proper answer. Probably what I then said was well susceptible of amendment as well as addition. An able and eminent member of the bar,

whom we have lost, used to say that there was no justice in August. Not agreeing with him to that extent, I do acknowledge that ever since I have been acquainted with the court there has been a prevalent notion that its light at that season is often on the wing, and I will not undertake to aver that on the 6th of August, 1852, I furnished any assistance towards a contrary opinion. It is, however, not material on the present occasion whether the Vice-Chancellor and the Lords Justices disposed correctly of the motion heard and decided by them respectively last year. Neither of the orders then made, merely interlocutorily as they were, can or ought to influence the court now in granting or in refusing the injunction. Not only is the motion before us a new motion, but we are also at the hearing of the cause, and this upon more evidence than that adduced in August, 1852, and upon facts some of which have occurred since that month. Perhaps the motions refused were properly refused: perhaps they ought to have been wholly or in part successful. The present question is of a decree to be made. One point probably against the informant and the plaintiffs is, that of acquiescence or laches. I think no such point established. Early and speedily after the first commencement of the defendants' project the plaintiffs protested against it openly and publicly, and they have uniformly declared and asserted practically their opposition to it. Whether this suit was instituted soon enough to entitle the informant and plaintiffs to an interlocutory order for an injunction may be doubted; but it was commenced, I think, soon enough to warrant them in asking the court for a decree, on making a case for one in other respects. The expenditure on the part of the defendants has taken place under full notice that it was objected to, and that endeavours were and would be in active operation to render it useless on the ground or alleged ground taken by the information and bill. Then comes the question of whether the acts done and intended by the defendants, of which the informant and plaintiffs complain, amount, or if performed will amount, to a nuisance in point of law; and upon the evidence now before the court I think that the question must be answered in the affirmative if propounded for the purpose and in the sense of the information or bill separately, and therefore in the affirmative if propounded for the purpose and in the sense of both together. Various highways in the town of Sheffield have since July last, in the prosecution of designs previously announced, been unlawfully broken up for the purpose of laying down the defendants' pipes. The same course of proceeding is intended to be, with equal unlawfulness, pursued by them in other public highways of the town to an extent still greater; and it must be taken as substantially certain that hereafter, in case of the absence of judicial interference to prevent it, the highways under which the plaintiffs' pipes lawfully, and the defendants' pipes unlawfully, have been or shall be laid, will in various places be from time to time, without just or lawful power, broken up by the defendants for the purpose of repairing their pipes, whether in consequence of casualties which may happen to them or otherwise, and for the purpose of making communications between their main pipes and dwelling-houses or other buildings. These illegal proceedings—effected and intended, present and future—may perhaps well be said in one sense to be of a temporary and transitory and not of a perpetual or permanent kind. But from the nature of the case there is obviously, I think, another and probably more important sense in which a character of perpetuity and permanence may properly be ascribed to them. It has been argued that the annoyance, if any, felt and possibly to be felt, may be small, slight, and unfit for this court's interference; but the frequent occurrence for ever, or during a period probably long and unascertained, of an annoyance slight in itself—slight, I mean, if occurring upon a single day or occurring only at intervals—may much interfere with the reasonable convenience and comforts of life. Upon the evidence now before us it is, I think, reasonable to believe that during a period probably long and unascertained, the defendants' proceedings under consideration, unless judicially prevented, will unlawfully be of frequent occurrence, and will unfortunately be of very frequent occurrence, and will unlawfully create from time to time inconvenience to persons who, as travellers or passengers, may have occasion to use the public streets and highways in Sheffield, the shopkeepers and other inhabitants of the town, and to the plaintiffs. Nor, if we now refuse an injunction, can it reasonably, I think, be denied, that in respect of these unlawful proceedings—actual and intended—redress, remedy, or punishment may from time to time for many years to come be put at law, criminally or otherwise, to a very inconvenient and burdensome extent, of diversifying litigation at the instance of a variety of persons. Those, the defendants may, it is true, be inclined to disregard; but what they are indifferent to may be of great importance to the plaintiffs, and to some, on whose behalf, or for whose interest and protection, the Queen's Attorney-General is to be considered as suing here. There are persons, certainly, who are pleased with the operation of putting the law in motion in its numerous departments, and do not dislike its frequent repetitions. Thus, however, more often vicariously than otherwise, but in theory if not practically, the multiplication of suits and prosecutions must be considered as something very different from a blessing, so far at least as her Majesty's unprofessional subjects are concerned. There is, too, another aspect of this case which may deserve attention. Mr. Overend, before the Lords Justices in January of this year, assumed, not unreasonably, and argued upon the possibility, that the defendants in the course and by the aid of time may through submission or acquiescence—this court not interfering—acquire in the soil or in the use of the soil of the streets and highways, where their pipes are proposed to be and are now laid down, a right not now existing, which if acquired may be found considerably inconvenient, publicly as well as privately. I do not think that this argument has been displaced or answered. Certainly I am aware that the bill in this court is a bill by the plaintiffs on their own behalf merely; but it cannot be denied that by way of easement or otherwise they have in the soil of the streets and highways within the town, under their act, an interest exceedingly different from that of persons merely to use them for walking, riding, and driving, or to have the approaches along them to their shops, warehouses, and dwelling-houses, preserved in an uninterrupted or unobstructed state. Something has been said on the subject of riots or unlawful assemblies—that skirmishes and battles between the opposing forces, native and auxiliary, in the contending companies, is likely to be serious unless we interfere; but into that part of the argument I consider it unnecessary to enter. It seems to me, however, right to notice the incorporation, whether completely or incompletely, of the defendants, and the quantity of persons thus associated together. They have the advantage and strength of lastingness, union, number; and it may well be thought—nor is it new to hold or to act upon the opinion—that infringements, even slight infringements, of right in respect of land by persons or bodies so circumstanced, require especially to be watched with a careful eye and repressed with a strict hand by a court of equity, where it can exercise jurisdiction. The propriety of the bill may probably well be thought open to more doubt than the propriety of the information in the present case. But I consider both to be well founded,—the information upon the ground of the public and general nature of the nuisance: the bill, if on no other ground, yet on account of the interests in the nature of a private interest, whether by way of easement or otherwise, in the soil of the public highways in Sheffield, which I have referred to, namely, that which the plaintiffs as a company have under their act of Parliament,—an interest likely, I think, as I have said, to be prejudiced by the defendants' illegal proceedings—not a prejudice in the sense or way of interference with a monopoly. The plaintiffs cannot be truly said to have any right in the nature of a monopoly; but they are entitled to have their pipes protected, and to exercise fairly the powers conferred upon them by the Legislature, which has for the general good placed them under obligations and liabilities that the defendants are exempted from. It has been urged, and perhaps not without foundation, that the majority, or at least a very considerable portion of those who comprise the governing body, and of the inhabitants generally, of Sheffield, are disposed against this suit, and wish well to the defendants and their operations; and it is also plausibly contended that it will be rather on the whole to the convenience or advantage rather than to the inconvenience or disadvantage of the town. A fact, too—I suppose it to be true—was urged, that there are many parts of England where companies such as the defendants, and constituted for similar purposes, exist, whose works, without any authority from the Legislature, and without litigation or any objection, have long been and are still interfering with the streets and public highways in the manner here complained of, and which ought to be prevented. Each of those considerations probably deserve some attention, but they are not, I conceive, conclusively in the defendants' favour, and are in my opinion outweighed by others. If this suit is opposed to the views and wishes of a majority of the governing body and the general inhabitants of Sheffield, the minority do not, therefore, lose their rights. Their views of what is for the convenience and advantage of the town are not necessarily to be disregarded in a case where they have law on their side; and if the informant and plaintiffs would have a right independently of what has been and is going on in other towns or places, they are not to be deprived of it because the inhabitants of this town and other places may, through the success of this suit, be disturbed or inconvenienced. The Legislature is open to all, and, therefore, to the defendants, who, if they shall desire parliamentary authority for their undertaking, and shall make out a case for it, will I dare say obtain it. The probabilities will be expense of an opposition before a committee of the two Houses of Parliament, which has been properly enough made the subject of remark, but it ought not to influence our judgment. It has been said, too, that there are parish surveyors or local boards to whom or to which the defendants are willing to submit; and certain agreements upon that subject—perhaps of a lawful, perhaps of an unlawful nature—have been produced. But neither are the surveyors nor boards of such extent, or force, or practical utility for the purpose now under consideration, as those which the Court of Chancery can exercise; nor, if they were, would it be right for the court, therefore, to abdicate an important and useful branch of its own undoubted jurisdiction. Nor can the Attorney-General or the plaintiffs be required to trust or to resort to the active discretion or judgment of any surveyor or board, present or future, changing or unchanging, partial or impartial, wise or unwise, for the prevention or protection which it is the object of this suit to attain. There are legal proceedings pending, with which the relator or plaintiffs, upon having an injunction, ought, I think, to undertake to deal so far as they can in any manner, that the court, on any application or suggestion from the defendants now or hereafter, may deem reasonable; but the pending of these proceedings ought not, in my judgment, to delay or impede the action of this court in a case where the law of facts appear to me to be free from obscurity, especially since an important statute, which, though at present in operation, was not, I believe, so in August last. Not forgetting the expression attributed, and probably with correctness, to Lord Eldon in the case of the Attorney-General *v.* Cleaver, and also not forgetting those to be found in the case of Crowder *v.* Tinckler, I am of opinion that the informant and plaintiffs are entitled now to an injunction—until further order—substantially, though not exactly in the terms they pray it, upon the undertaking I have just mentioned being given by the plaintiffs and the relator, with liberty to either party to apply—a liberty which may be especially useful in the event of a certain result or trial of the pending indictment. As to the costs of the suits, I have entertained and still entertain too much doubt to enable me to concur in any order as to any costs of the relator, or the plaintiffs, or the defendants.

The Lord Chancellor: This cause comes on to be decided under circumstances somewhat unusual, and whatever be the result, at least it cannot be said that the subject has not in one form or another received a more than ordinary degree of consideration and discussion. A motion for an injunction was made first in the spring of last year, before Lord Justice Turner when he was Vice-Chancellor. That was upon the

bill before there was any information filed, and that was refused. An information and bill were then filed, and the motion was renewed. I say renewed, although, in form and substance in some sort, a new and distinct motion. But the same question had to be discussed, and Lord Justice Turner, with his usual accuracy and attention, again considered the subject, and came to the conclusion that the injunction ought to be refused. That motion was brought by way of appeal before the Lords Justices, and heard by them a day or two before, and finally decided on the 6th of August, when the Lords Justices were of opinion that the then Vice-Chancellor Turner had rightly decided, and affirmed therefore the order which he had made. Application was then made to the Lords Justices in Michaelmas Term last, proposing to renew the same motion, but upon a new state of facts which had arisen since the former motion had been disposed of; and the Lords Justices then suggested that it would be infinitely better, instead of hearing an interlocutory motion, that the cause should be set down for hearing upon affidavits according to a course which has been usefully and commonly adopted of late, and that the cause and motion should be heard and diposed of at once. The parties acquiesced in that, and in that state of things the cause came on to be heard before the Lords Justices in the last term. As I understood from them, it was fully argued; and after it had been heard by them, they intimated to me, not having finally made up their minds on the subject, that they were apprehensive that they should not concur in the view they took as to what ought to be done. And although the Legislature has in such cases provided for that result when that which is before the Lords Justices is an appeal from some other decision, no such provision is made with reference to that which is an original hearing. The Lords Justices in this state of affairs suggested to me, as it was not improbable there would be a difference of opinion between them, that the cause should be heard again by me either alone or by the full court, the latter of which I thought much better, as it would then be disposed of when even if they did differ there would be no defect of justice, because I should come in as a sort of umpire, and decide upon which side I considered the justice of the case to be. Now, I have heard this cause fully argued by one counsel only on each side, and very ably argued, necessarily consuming a good deal of time from the quantity of affidavits, and I confess I have come to a clear opinion against the plaintiffs. When I say a clear opinion, I need hardly say that (two such opinions as I have on each side of me differing) anybody of course must feel that he may very possibly err. That is the opinion I have formed, and I will state shortly the grounds on which I arrive at that opinion, because, after the matter has been so fully discussed, it is only necessary for me to state on which side I incline in giving my opinion; and giving my reasons would, in truth, be only repeating the reasons already stated to a great extent by the Lords Justices. It appears to me that both the Lords Justices concur substantially on this point, that it is a question of degree whether the court will interfere or not. If that is the case, and that be the right view of the question, then the point is, whether or not such a probability of substantial injury to the rights of the public passing along the streets of Sheffield, or the inhabitants using those streets, has been made out so as to make it a reasonable exercise of jurisdiction for this court to interfere to restrain them. Now, I confess that my opinion is, that no such case has been made out as was suggested by Lord Justice Knight Bruce, as to a doubt being on his mind whether the Lords Justices had rightly decided in August. I confess, that in the course of the argument here, a similar doubt did pass through my mind; but I have come to the conclusion not only that that doubt was not well founded, but to a still stronger conclusion upon the hearing—that there is no case for enabling us to act otherwise than as we then acted. Then, is the evil of such a nature as to justify the court in interfering? What is the evil? It is said that the defendants are about to tear up the streets to an extent, one representing 70 miles, the other 100 miles. Take it that 100 miles of the streets are to be torn up. That is rather an argument popularly taken, than one which ought to influence one's judgment. It may be that, before they complete their works, they will have taken up the pavement over 70 miles, but they will never have up above twenty yards at the same time, and they will never have that up, they say, for above two days; but I should think, as they are getting on with the work, not above three or four hours. That is my experience from what one observes when similar works are going on in the metropolis. It is no sooner begun than ended; and it seems to me that the circumstance that it is to be done at an infinite variety of places in the course of the next two or three years, or the next year, during which time the process of laying down the pipes will be going on, does not appear to me at all to vary the case. One must look at the quantum of evil at each particular place, and at each particular moment of time, to see if this injunction could be sustained on the ground that there is a continuity in the sense of going from one place to another to extend over one or the next two years. I do not see that that is a ground for interfering. Putting it by way of illustration, what is there to prevent the court from restraining a person coming with a barrel-organ through the town and disturbing the peace of the inhabitants? No doubt it would be a very serious nuisance if a person with a barrel-organ or bagpipes were to station himself under one's window all day: that would be a nuisance. But when he is going through a city, you know he will stop ten minutes at one place and ten minutes at another, and so he will go on all day. If the one sort of nuisance could be restrained, I do not see why the other could not. There is a distinction, no doubt: the one interferes with the soil, the other is collateral to any interference with the soil. I do not see, in point of principle, that it makes any great difference. But I do not rest this case merely on my own opinion as to its being a very small degree of injury indeed, but I think it may be safely deduced from the acts of the legislature that it is to be so considered. Now, I come to this conclusion from the different sources to which our attention has been called—from the terms of the joint-stock registration act; because that act by name authorizes gas companies to be formed as joint stock companies for the manufacture of gas. It contains a provision giving a category of certain associated companies that cannot carry their works into operation without the aid of Parliament, but it does not include gas companies among them. When that argument was pressed I suggested that perhaps the legislature might contemplate a company formed for making gas behind a row of houses, and supplying them with gas through their own land with their consent. That was a suggestion that passed in my mind, but I cannot seriously believe that it was any arrangement of that sort that the legislature looked to. The legislature must have looked at the fact that companies may be formed for the manufacture and supplying a town with gas, and may carry their association, which they contemplate, into effect without the aid of Parliament, which must mean that they thought impossible that they might do this in some way to supply the inhabitants of a particular town or district with gas although the legislature had not authorized them to do that which but for the legislature it was said they could not do. Then it was said, did they think they might come and violate the law by tearing up the pavement? I have two solutions in my mind on that subject, either of which I think is pretty satisfactory. Perhaps the legislature thought they would only do this with the sanction of the surveyors or proper authorities, which would prevent their doing anything which they considered injurious to the public, who would pass along and use the road or street in which the pipes would be laid, and that it might be safely entrusted to them. Or, it may be that the legislature did not consider the act of taking up the pavement for such a legitimate purpose as this a nuisance at all. That may probably be the question to be decided on the trial of the indictment. If I thought the question of injunction or no injunction depended on that I should have been very apt to ask the lords justices to concur with me in letting this cause stand over till after the trial of that indictment, but I do not think so. If it is unlawful, I think it is too small a degree of unlawfulness to warrant this court's interfering by way of injunction. But I must say that when the cause was argued before the lords justices in August last, and I myself said we do not want any Court of Law to tell us that tearing up the pavement was a nuisance, I did not then advert to the particular circumstance of the act contemplated by these defendants, but merely to the general proposition; and I cannot say that it appears to me absolutely impossible to be held that the taking up the pavement for such a purpose as this is not a nuisance. I do not say how the matter may be, but it may be held to be analogous to this sort of thing:—If I were to station a cart in the street opposite my door, obstructing the public highway, I might be guilty of a nuisance for aught I know, and I might be liable to be indicted; but it would be a sufficient answer to say that the cart was there only a reasonable time and for a lawful purpose. If it is used in the way in which such things are ordinarily used, it cannot be a nuisance so to use it. The public highway is for the convenience of mankind, and so to use it cannot be a nuisance. One of the uses is that people travelling along with a horse or carriage or cart may draw up at a particular door and get down according to their lawful occupation. So again, if I have a cart come to my house with five or six tons of coal, of course it will be some time obstructing the public highway, but it is difficult to maintain that in an ordinary street that would be a nuisance. All these cases of nuisance or no nuisance, arising from particular acts, must, from the nature of things, be governed by particular circumstances. Now, if a carriage were to drive up in Belgrave-square, and stand half the day at the door of a house waiting for some person calling there, I do not think that that could be made out to be a nuisance. It may be said, "You stayed there an unreasonable time." It may be so, but it would be difficult indeed to make out that that was a nuisance. But suppose the same thing happened in the street that runs from Covent Garden to St. Martin's-lane, a man calling there and saying, "I mean to have a chat for half an hour," I do not know that that would not be a nuisance. You must be governed by the particular circumstances. You must look at the particular place or object that the parties have in view. I take it that all these questions are of this nature, "Are you using the matter which is the subject-matter of inquiry in a reasonable way, and according to the uses for which it was contemplated?" It may be that the tearing up of the pavement is not, even for the purpose of laying down gas, anything that was ever in contemplation, and that it cannot be done without the authority of the Legislature, or some other competent authority. But, as I said before, if I thought that the question turned on the decision of that point, I should probably have wished the matter to stand over till after the trial of the indictment. Not thinking so, but thinking that the evil, if any, which does exist, is of such a very transient nature that, at no one spot, or to no one individual, can it be said to be more than a passing and almost imaginary evil, I am of opinion that no case is made out for restraining these parties. Let me add just one word with reference to what is suggested as to the future evil of tearing up the streets for the purpose of repairs and the cause of accidents. Upon that subject I can only say here that I must deal with that exactly in the same way—is there such a probability of serious injury as would induce this Court to interfere? Everybody who has lived in this town, has lived probably in a house where there have been gas pipes running along the front of it. Speaking for myself I can say, that I have experience of it for some twenty or thirty years and considerably more, and I have never found any nuisance from such a source. I do not mean to say that evils may not occasionally occur; but I think that the interests of mankind require that those things should be disregarded. We live in a social state in which we are all liable to accidents of this sort, and if these works are not to be carried into effect because there may be evils of that sort accidentally occurring, we should be entirely altering our social system, and not proceeding according to the mode we have of late. I concur, therefore, with Lord Justice Turner in thinking that this bill and information ought to be dismissed, though I entirely concur with both the lords justices that nothing should be said about costs.

Mr. Rolt: Did your Lordships intimate that it was without prejudice to our filing a new bill?

The Lord Chancellor: In the Chorley water-works case we thought it was necessary. It is not necessary to say that I think, "without prejudice to filing a new bill upon new facts." You may file a new bill upon new facts if you like.

The majority of the Court being opposed to the granting of the injunction, it was consequently refused, each party paying his own costs.

JUDGES' CHAMBERS, Rolls Gardens.

Tuesday, March 1.

(Before Mr. Baron Platt.)

WAKE *v.* THE SHEFFIELD GAS CONSUMERS' COMPANY.

SPOONER *v.* THE SAME.

This was an application to set aside the issues and notices of trial in these actions of ejectment, on the ground that they had been delivered too soon, and within four days after appearance had been entered by the defendants.

Mr. Chitty appeared as counsel for the defendants in support of the application, and stated that these actions were brought to recover certain land in Bank-street and Water-lane, Sheffield, occupied by the gas-pipes of the defendants' company. The writs were served on the 9th of February last, appearance entered on the 25th, and the plaintiffs on the 26th delivered issues and notices of trial for the next Yorkshire assizes. On the 1st instant the defendants gave notices to limit their defence to certain parts of the land mentioned in the writs [the land above and below their pipes and one foot on each side of them, also such portions of land as might be required for laying down their service and other pipes]. Mr. Chitty referred to the 174th and 178th sections of the common law procedure act, and contended that as the defendants had, four days after appearance, to give the notice to limit their defence, the plaintiffs could not deliver issue within that period. He argued that the 178th section, which enacts that, "in case an appearance should be entered an issue may at once be made up without any pleadings," when construed with the remainder of the section, merely meant that pleadings were to be dispensed with, and that the words, "setting forth the writ and stating the fact of appearance, with its date, and the notice limiting the defence, if any, of each of the parties appearing, so that it may appear for what the defence is made, and directing the sheriff to summon a jury," showed that the issue could not be made up until the expiration of the four days, as the notice limiting the defence was to be mentioned in the issue, which should also state the part for which the defendants defended. The learned counsel referred to the form in schedule A, No. 15.

Mr. Cowling appeared for the plaintiffs, and contended that the issue might be delivered immediately on the appearance being entered. He relied on the first part of the 178th section. But if that were not so, the defendants had given a notice of their appearance, which it was unnecessary to give unless they intended the appearance to be an appearance for the whole; and after that notice the plaintiffs were entitled so to treat the appearance, and to deliver issue and notice of trial.

Mr. Baron Platt said that the common law procedure act of last session would bear two constructions. On the whole, he decided to grant the application to set aside the issues and notices of trial, though not without considerable hesitation. He declined to give the costs of the application, as this was the first case decided on the 178th section of the statute.

The effect of this decision will be to prevent the actions of ejectment being tried at the ensuing assizes at York, but the plaintiffs are at liberty to sign judgment and issue execution forthwith for taking immediate possession of all the land in dispute, except that to which the defence is now limited.

OXFORD CIRCUIT.—READING, March 1.

(*Before* Mr. Justice Williams.)

HAMPTON *v.* THE OXFORD GAS COMPANY.

In this case the plaintiff, an aeronaut of some celebrity, sought to recover damages, estimated at upwards of £100, for the non-performance of a contract by the gas company to supply his balloon with gas on occasion of an intended ascent at Oxford in June last. The defendants by their pleas denied the contract, and also alleged that the plaintiff prevented them from performing it by not being ready to receive the gas.

Mr. Whately, Q.C., and Mr. Pigott, appeared for the plaintiff, and Mr. Sergeant Allen and Mr. Phipson for the defendants.

Mr. Hampton, the plaintiff, was examined in support of his case, and stated that he made arrangements to ascend with his balloon at Oxford during the commemoration in 1852; and Tuesday, the 22nd of June, was fixed on as the day, the permission of the Vice-Chancellor having been obtained. As early as the previous month of April he put himself in communication with Alderman Sadler, the chairman of the Oxford Gas Company, on the subject of a supply of gas, and he eventually agreed with him for 40,000 cubic feet for £10 in money, and £2 worth of tickets. On the 17th of June the plaintiff ascertained from Henwood, the engineer of the gas company, that a 2-inch main-pipe was to be employed in conducting the gas, and, on remonstrating that it was too small, was told that it filled Mr. Green's balloon on a former occasion. At Henwood's request the inflation commenced on the 21st, but was stopped in the course of the evening, and was not renewed until 7 o'clock the following morning, although the plaintiff was told to be ready, and was ready as early as 4 o'clock. In the course of the morning and afternoon he complained repeatedly that the gas was not supplied in sufficient quantity. Henwood alleged that the balloon was tied down by ropes, and that prevented the gas from inflating it, and, on the contrary, forced it back. At his request the management of the balloon was given up to him for an hour. The plaintiff, apprehending that the balloon was in jeopardy from the ropes being relaxed, and the wind being high, told Henwood he must be responsible for any damage, and the balloon was again committed to the plaintiff's superintendence. When six o'clock, the hour for the ascent arrived, and a considerable number of persons had assembled, it was found that the quantity of gas was wholly insufficient to raise the balloon, although all the ballast was removed; and the plaintiff at last proposed to ascend alone on the hoop without the car. At the suggestion of Alderman Sadler, who promised that a sufficient quantity of gas should be supplied on the following day, the plaintiff addressed the spectators to that effect. No money was returned to them, it being impossible to distinguish between those persons who paid only 6d. for admission, and those who paid 2s. for reserved places. No ascent was made on the next day, for the balloon was forced to give way to Mr. Darby, the pyrotechnist, who had pre-engaged the ground for a display of fireworks.

In support of the plaintiff's version of the case, several witnesses were called, some of whom deposed to the incapacity of the company's pipes to supply the requisite quantity of gas, and stated that a four or five-inch main was generally used to fill balloons. It was also explained that Mr. Green's balloon, filled by the company in 1848, was of smaller dimensions, and that an additional pipe was laid down from the gasometer on that occasion.

On the part of the company it was alleged, and sought to be established, that the plaintiff, alarmed at the boisterous state of the weather, had determined from an early period of the day not to make the ascent; and that, in order to excuse himself, he formed the design of charging the gas company with a failure of their contract. The plaintiff was cross-examined as to whether he had not made similar charges against other companies; but he stated that he had made upwards of 100 ascents, and had only failed twice from the insufficient supply of gas; and that in one of those instances, which occurred at Maidstone, he received £30 from the parties who had contracted to supply him. He explicitly denied that he had been forced to ascend at Cremorne-gardens under the threat of a horsewhipping from the proprietor. He also denied having used expressions to workmen employed at the Oxford Gas Works, showing that he was apprehensive of the weather, and of coming in collision with the adjacent buildings.

Alderman Sadler, of Oxford (himself a nephew of the distinguished aeronaut of that name), and a number of witnesses, were called to show that the fault was not in the supply of gas, which was amply sufficient, but that the plaintiff kept his balloon tied down so tight, that, instead of the gas entering, it was forced back into the pipe. Mr. Henry Green, the aeronaut, and brother of Mr. Charles Green, was examined as to the ascent at Oxford in 1848, and proved that there was no failure on that occasion.

The jury returned a verdict for the plaintiff.—Damages, £80.

THE DARLINGTON GAS AND WATER POOR-RATE ASSESSMENT.*

The appeal of the Darlington Gas and Water Company against their poor-rate assessment, according to adjournment, was heard before a special session appointed for the purpose at Durham, on Tuesday, Dec. 28. Mr. S. Grey and the Hon. A. Liddell (Mr. Peacock, solicitor), appeared for the appellants; and Mr. Otter and Mr. Davison (Mr. Allison being solicitor), for the respondents.

Mr. Grey opened the case. He said the court were aware that this was a case in which the Darlington Gas and Water Company were appellants, and the parish of Darlington the respondents. It was put down in regular order, and was to have been tried at the last sessions; but his friend on the other side persuaded the court that it would last such a long time, and so could not be tried then, on which account the court were pleased to devote this particular day for the hearing of it. But, although they had the whole day, and, in fact, the whole of the week before them, yet he hoped that neither his friend nor himself would presume too much upon that advantage, but would curtail the matter as much as possible. As regarded himself, he felt sure that it would turn out that he would occupy a very short time indeed. He believed, too, that it would be found that they had most substantial grounds of appeal, which were, that the company had been rated by the parish officers at the gross sum of £1600, and £1335. 5s. as net value, which is arrived at by deducting as nearly as possible the usual proportion for the first item. He then proceeded to enter into the history of the undertaking. In 1830, an act of Parliament was obtained under whose provision a company, called "The Darlington Gas Light Company," was formed to supply that town with gas. It was formed under a deed of copartnership, and then became a joint-stock company. It continued in existence till 1846, when, in the month of September of that year, it sold the works and everything connected with it to the present gas company, which was then formed, and called the Darlington Gas Company, a variation in the name being usually made in such cases. Then, by an act of Parliament obtained in 1846, that company was merged into the present one, and so it had continued ever since; but, in addition to that, in 1848 a water company was formed, and in 1849 the two undertakings were amalgamated together under the title of "The Darlington Gas and Water Company," and it was upon the joint property of these two companies that this rate was made. Until 1848, he would show them the gas company were rated at a gross rental of £282, and £235 net, in which year the rate was increased to £660 gross, £550 net. At the October sessions of that year, the company appealed against that exorbitant assessment; the case was heard, and resulted in the rate being reduced from £660 to £456, or from £550 to £300. The company had continued under that rate until the present time; when, all at once, by one "fell swoop," or *coup-de-main*, as it might be called, the parish officers of Darlington have rated them at a sum of £1600. Now, it

* The press of other matter has prevented the earlier publication of this report.

was against this enormous increase that the company appealed. No doubt, it may said, that since the company were last rated, viz., in 1848, additions had meen made to the works, and that the prosperity of the company had very much increased, and that a water company has also been established and connected with it. No doubt there is some truth in all this; in fact, the company did not deny that the old rate ought to be increased, in common with their increasing prosperity; but an increase from £450 to £1600 is beyond all reasonable calculation, for he believed it could not be shown by the overseers that they have any true ground for raising the rate to any such sum. Of course he did not know what their grounds were. In these cases it was exceedingly difficult to arrive at the exact point, or to point out the precise sum at which such things ought to be rated. By the Parochial Assessment Act, a rate is declared to be "such a sum as a tenant would fairly give to rent the works." One of their grounds of appeal, and he thought advantage must be taken of it, was that they had rated the profits upon the property. Now, it was quite clear that profits are not rateable; and in this case he thought that the overseers, in rating the property, had proceeded upon some notion of that kind, because a gas company consists of many other things besides the manufacture or gas; as, for instance, they lend out meters upon loan, and also do plumbers' work, with some other things from which they derive a considerable profit; all of which do not interfere with gas in the slightest degree. Then, of course, they are rated upon their machinery, and different apparatus for carrying on their manufacture, and indirectly, though not actually, upon the profits of their trade. Of course, he admitted that the larger and more extensive the works, the more in proportion would be the rate, as their trade and profits would be the greater; in such cases, of course, the rate would be proportionably larger, for the larger the concern, of course there would be a larger rate; and that was the true principle upon which rates for such property ought to be made. But they who had made the rate in the present instance could not have proceeded upon that principle, but have gone upon some wild notion as to what were the profits, if, indeed, there were such profits accruing to the company as were supposed. But it would then be said, "Produce your books;" but was it fair that a company of this kind—was it right, convenient, or proper—that all their interminable transactions should be brought and exposed before the public, when there was a reasonable way of arriving at a conclusion upon the subject without without them? But why produce our books? He would endeavour to explain how and why he arrived at what the rate of property clearly ought to be, for which purposes he would call two witnesses: Mr. Hawkesley, whose name, perhaps, was familiar to the bench, as being one of the most experienced gas engineers, and knowing more, he had no hesitation in saying, than any other man in the kingdom, as regarded gas and water. He would also call Mr. Emmett, who was also very well acquainted with such matters, having a very extensive experience in connection with them. Mr. Hawkesley was the engineer to the Durham Gas Works, and had been connected also with almost all the large gas and water works in the country. He would explain to them, when called upon, three various ways of estimating the rateable value of these sort of works. It was not so easy to arrive at a conclusion in rating gas works as water, the latter being much more simple and less complicated than the former, as it was only necessary to pump the water in its element as derived from nature, when all they had to do was to divert it into whatever channel the case required. But with gas the case was different, that being more of a manufacturing process, and ought to be looked at in rather a different point of view. There was skill required; the works, material, and apparatus, necessary, and the wear and tear of them. All this, in respect to gas, was greater than as regarded water, and therefore, no doubt, it should be looked at in a different view, and more liberal allowance, perhaps, be made for it than for the water. Now, it was said that gas works, being available as manufactories, were not rateable in the same manner as water works, but ranked higher. Now, Mr. Hawkesley and Mr. Emmett had made calculations to ascertain, so far as their experience would allow, the proper mode upon which these works ought to be rated. As for the company, they had no desire at all, he might say, to shirk any rate or responsibility which rightly belongs to them, but would submit to all that is just and reasonable; they only ask to be treated as others, and to have put upon them such a rate as the merits of the case warrant; but not such a sum as has been laid upon them by these extravagant overseers. They would shortly state how they have formed their calculations in these matters, having gone into it in four different ways. One of these, particularly in regard to gas works, was by taking the quantity of coal consumed for the production of gas, in a year, which amounted, he believed, to 1550 tons. Now, it is known, as they would admit—he did not know whether the overseers would attempt to rebut it or not, but he believed it could not be rebutted—that such a quantity of coal will produce a certain quantity of gas: a ton of coal, for instance, would produce 9000 cubic feet of gas.

Mr. Otter: No, 10,000.

Mr. Grey: The men who have instructed you (Mr. Otter) may know better than Mr. Hawkesley, but, as for himself, he would not pin his faith upon either the one or the other. He would put him into the box, and Mr. Otter might interrogate him as he liked. His (Mr. Hawkesley's) reputation and experience were beyond the slightest possible doubt whatever, and he would tell them the calculations which he had made. He would tell them that he has arrived at his conclusion of the rateable value of the works by deducting the different expenses connected with the works, which, in his great experience, are matters of every-day practice with him, though they might seem rather novel to many others. He had made various deductions, then, from the gross realisations of the company, in respect of their works. The court would see what they were, and, he believed, would see that they were extremely reasonable. Calculating so much for every 1000 cubic feet of gas made and consumed, the rate would be considerably raised above what it stands at, but far under the exorbitant sum which the overseers have put upon it, which was about one half of what they had rated it at. When, in 1848, the rate was reduced from £650 to £450, any increase like £300, it appeared to him, would be far more likely to be correct than increasing it at once £1000 and upwards, making it £1600. It did appear, from the calculations of Messrs. Hawkesley and Emmett, that in putting on such a sum they have exceeded all bounds of moderation in the matter. He (Mr. Hawkesley) would state that he has made the calculations in various ways, having calculated upon the principle which has been always followed in estimating the value of these sort of works. He would explain to them fully the different modes which he had pursued in making a calculation of their value, and the conclusion, he believed, would bear comparison with a great number of gas works in the kingdom. They would see that they were made upon the sum laid out in the building, and apparatus for manufacture; such calculations being found to be made at the rate, generally speaking, of 2½ per cent. on the sum invested in the undertaking for the net rate, and 3 per cent. on the same sum for the gross rate. Then, again, taking it at what it would be let to a tenant upon a non-repairing lease—which was one of the modes they had acted upon in ascertaining the rateable value of the works—and according to that calculation, pretty much the same sum was arrived at, being considerably below what it had been rated at by the overseers, and far short, at least by one half of the sum against which they were appealing. He did not know what arguments his friend on the other side might make in support of the rate; but, if any man should say that he was prepared to give £1600 as tenant for the works, they would have an opportunity of judging of the stability of their grounds for so expressing themselves.

Mr. Otter: We offer that now; there are most respectable and responsible men ready to take it on those terms, for a lease either of 10, 15, or 21 years.

Mr. Grey: If I might be allowed to call my learned friend to order—

Mr. Otter: Do you doubt it, then?

Mr. Grey: I doubt nothing; but I know this, that, whenever an offer is blurted out in this sort of way, it is all moonshine and claptrap. It is all very well—[Mr. Allison shakes his head, Mr. Otter nods, and Mr. Davison looks first at one and then the other (laughter)]—but the fact is, it is all moonshine for the purpose to catch the court. I will tell you why——

The Chairman: It is not necessary to enter into this.

Mr. Grey: I will tell you why it is moonshine. The act of Parliament prevents the company taking any lease for their works, or letting them at all; and, therefore, it is all mere moonshine and claptrap to talk of persons being ready to give this, that, and the other, for these works. However, I promised to be short, and examine at no great length. I will now call this witness, Mr. Hawkesley, before you, and the court will hear, and judge, from what he says, as to what is the real rateable value of this property. He is, as I have said before, a man of great experience. He and other witnesses will state how they have proceeded; and then the court will decide, and will not find it a difficult matter upon which to form a conclusion. Although the rate ought certainly to be increased somewhat to what it at present is, they ought not by any means to be put down at the preposterous sum at which they were. It was a short-sighted policy on the part of the overseers of Darlington to proceed as they had done; for he thought they were not merely spending money at law, but when they consider, supposing they should succeed, that the effect would be to make the company raise the price of gas to the townspeople of Darlington, who are the consumers, in order to make up for the loss they would sustain—which would be, no doubt, the effect of it—it was a short-sighted policy on their part. Of course they could strain the thing as they chose, and all they had to do was to resist it; and the court would see whether they were right in doing so, or wrong. He then called—

Mr. *Thomas Hawkesley*, who was examined by Mr. Liddell, and deposed as follows:—I am a civil engineer, and have had many years experience in that profession. I am the principal engineer to the Nottingham Gas and Water Companies, and a great many other gas and water companies in this country. I have had frequently to consider the value of these sort of undertakings for the purpose of rating. I have made a calculation of the gross and net annual value of the gas and water works at Darlington, for the purpose of the poor rate. I have ascertained that 1550 tons of coal have been consumed in the works in one year for the production of gas——

Mr. Otter: Have you been at the gas and water works during a year?

Mr. *Hawkesley:* No, I have not.

The Chairman: Then how do you know what number of tons of coals have been consumed?

Mr. *Hawkesley:* From the company's books and information which they have furnished me.

Mr. Otter: If the books will show the quantity of coal consumed, I have no objection to your proceeding.

Examination continued.—I have not examined the company's books myself as to the stock, but they have been examined by another gentleman, on that particular point, who is present. If the company consumed 1550 tons of coal in a year, that would produce 14,000,000 cubic feet of gas, at the rate of 9000 cubic feet to the ton. That is the quantity produced in London and other places where Durham coal is used and due care is taken. A larger quantity can be made, but that is the average. The usual reduction made in consequence of leakage and other contingencies is 20 per cent., which would give 2,800,000 cubic feet, to be subtracted from 14,000,000, leaving 11,200,000 of cubic feet as the net quantity, or residue, for sale. That residue would have to be divided for sale into public and private lights. If, out of that residue, 2,800,000 cubic feet were sold to the public or the Local Board of Health at 3s. per 1000 feet, that would give £420; and, if the remaining 8,400,000 cubic feet were sold to private consumers at, say, 4s. 9d. per 1000 feet, that would give £1995.

Both items would give a gross total revenue to the company from gas of £2415.

Mr. LIDDELL: We now come to consider the expenditure incurred in the manufacture of this gas.

Examination continued.—A ton of coal produces 9000 cubic feet of gas. The price of the coal may be taken at 6s. per ton. After each ton of coal has been converted into gas, it leaves several things, such as tar and ammonia, which will realise something by sale. The quantity of tar and ammonia produced from a ton of coal would sell for 2s. 7½d.; thus leaving 3s. 4½d., which, being divided by 9 according to the usual mode of calculation, would leave 4½d. for the cost of every 1000 feet of gas. The quantity of lime required for purifying gas was at the rate of half a hundred weight to a ton of coal. That quantity of lime would make a charge of a ½d. upon every 1000 feet of gas. For the wear and tear of retorts, furnaces, &c., I allow 3d. per 1000 feet, which is reasonable, as the prices for such things have risen lately. Another item of deduction is for continuous repairs to apparatus, constantly needed, for which I have allowed at the rate of 1½d. upon the same proportion of 1000 feet, as stated before. For wages, from the commencement of the manufacture of gas to its distribution in lights, I have allowed 8½d., which includes lamplighting. Engineering expenses in similar works amount to about 1d. per 1000 feet. Salaries, such as for secretary, clerks, collectors, and such-like offices, invariably amounts to 3d.

The COURT: What do you mean by engineering?—All companies are obliged to avail themselves of the assistance of a professional engineer to look over their works. Large undertakings in general keep an engineer upon the premises, but smaller ones cannot afford to do so. I have often been called in by the Darlington and other gas companies.

Examination continued.—For office expenses, stationery, advertising, and other charges of that nature, I have allowed 1d. per 1000 feet; for rates and taxes, 2d.; management, 1d., as payment of managing directors; for renewal of works, 5d., which is incurred in consequence of the continual wear and tear of the works and apparatus, rendering new construction necessary within certain periods; for instance, such as gasholders, retorts, pipes, and other apparatus used in the manufacture of gas, which, as they cannot be made to last beyond a certain period, are provided for in the annual charges.

The CHAIRMAN: But when that renewal takes place, is not the cost deducted at the time from the general fund?

Witness: No, it is generally charged upon the 1000 feet, and considered as bearing a part of the current expenses.

The CHAIRMAN: But how or when do such renewals of works and apparatus occur?

Witness: In this way. Sometimes a company has to throw aside their old apparatus and put in new; once in 20 years a gasholder will become unfit for further use, and be necessary to be replaced, and so with other parts of the apparatus.

Mr. LIDDELL: It is analogous to the maintenance of permanent way in a railroad.

Examination continued.—For bad debts I have allowed ½d. per 1000 feet—I have found it frequently to amount to 1d.; for law charges I have allowed ¼d. The law charges I find generally to amount on the average to £15 per annum. The total expenditure of gas thus accounted for is 2s. 7½d. per 1000 cubic feet; of course there will be some additional expenditure for the distribution.

Supposing the works were let to a fully qualified tenant, would you not allow that certain deductions ought to be made from that sum? and supposing he were his own engineer, or had not salaries to pay, or management, what would you deduct for that?

If he attended to the business himself, I would deduct 3½d. per 1000 feet, being for engineering and half salaries, 1½d. for each, which he would not pay for, it thus costing him 3½d. less, and bringing the expenditure for gas to 2s. 6d. for a tenant.

What do you allow for interest on capital?—I have only taken that at 5 per cent. He would be obliged to employ in the works as much capital as would be equal to half the income, and, if I allowed 5 per cent., that would give, nearly as possible, 1d. per 1000 feet. That would make 2s. 5d. as the cost of producing gas by a responsible tenant. According to these calculations, the gross income from gas is £2415, from which £1692 is to be deducted, leaving a net income of £723.

What do you allow upon this income for tenant's profit?—Twelve and a half per cent., which would give £302 to the tenant for the interest upon his capital and the trouble and time in attending to the business; deduct that sum for £733, and it leaves £431 as the residue, which is the rateable value for the gas works.

Mr. LIDDELL: Now, we come to the water works.

Examination continued.—I was the engineer to these water works, having constructed them. I believe that they are not yet fully developed, being only recently completed. As an engineer I know what may be the gross rental of the water works.

Mr. OTTER: How do you know it? do the books show the rental?—So far as it is ascertainable. Do you know what has been actually paid as rent for water during the last year?—Yes, £900 nearly.

Mr. OTTER objected to the witness being asked questions as to the amount of rental; for he could not know what the exact amount was.

Mr. GREY: He is not attempting to speak as to the actual rental, but he puts it down at £900, and was proceeding to give the reason upon which he founds that opinion, when he was interrupted.

Mr. OTTER then gave way.

Examination continued.—I found my belief that the rental would be £900, in consequence of the rate of supply indicated by the meters at the time; but I think it has been ascertained, partly at least, by a general knowledge. The quantities, as indicated by the meters were given to me by some person; I did not take them myself.

By Mr. GREY: As an engineer, I believe that the engine which now pumps up the water at the works is capable of pumping a much larger quantity than it does at present. From visiting the company sometimes, inquiring what business they are doing, and, from what I learn, I have been led to the conclusion that their rental is not exceeding £800; but, as the supply of water from their works is increasing, I put it down at £900 for the purposes of this rate.

By Mr. OTTER: You put it down from the information which was given to you?—I exercised my own judgment upon the statements I received. I do not know, except from the company, the amount of rent paid to them. I do not know how many houses are now supplied with water, but I do know how many were when the rate was made. I knew it when I made this calculation, having occasionally inquired the matter from the company.

By Mr. LIDDELL: Taking the annual rental at £900, I should deduct for ordinary working expenses two-fifths of the income, the usual deduction made for water works which would give £360. I should also allow 5 per cent. for interest on the floating capital, which upon a half year's rental would give £22. 10s. For renewal and reproduction of works, 1½ per cent. on the capital of £12,000, giving £150. Then, deducting for tenant's profits, 12 per cent. on the year's income, would give £112, which altogether would leave a net rental for the water works of £256 which added to £421, the net rental of the gas works, give a total of £677 as the net rental, and equivalent to a gross rental of £812 for both.

Mr. OTTER: Are you a shareholder?

Witness: I am not.

Mr. LIDDELL: Have you calculated this in any other way?

Witness: I have. First, I have made a valuation of the property. The mode of arriving at the conclusion is, to treat the property precisely similar to any other property in the parish—by measuring the works and buildings, and put them upon a fair charge as the ascertained value. Upon that I place 5 per cent. for rent, which is above the annual value of property in the township. From this mode of calculation I make the gross rateable value of both gas and water works £644. 14s., being £353. 14s. for gas, and £291 for water. The third mode is, by allowing a certain per centage on the money invested in the undertaking. To carry out this calculation, I go upon the premises, and ascertain by actual measurement the quantity of land covered, and then put upon it a price per yard. Then I value the buildings, putting down so much as would be sufficient to erect them. As regards the water works, I know the actual cost of their construction. I know, as a practical man, that the gross rental value of such works is as nearly as possible 3 per cent. on the capital invested for the gross value, and 2½ per cent. for the net. I find that this is a very accurate mode of rating for all parts of the kingdom. My calculation for the sum invested is £27,280 for both works. Upon that, taking 3 per cent. for the gross rateable value, it would give £860, and 2½ per cent. for net, £680. I have also calculated it a fourth way, which is, what a tenant would give for it for a year, upon a non-reparing agreement.

By Mr. OTTER: By a non-repairing agreement I mean that the tenant is not to do the landlord's repairs, but merely his own.

Examination continued.—I have put down the profits at £723, from which various deductions must be made. For instance, there was the renewal of works. He would not be charged with that, and therefore I add to £723, the difference, which is 5d. per 1000 feet, which amounts to £292. I add also again half of the amount for wear and tear of the furnaces, retorts, &c., which will give him £88, and also a further advantage of £44 for other incidental expenses. The tenant would, therefore, have a profit of £1147. Then I try the water works in the same way, and take the profits at £468. Then there was an allowance for depreciation of £172, which would give the tenant a profit of £540 per year out of £900. The two concerns—gas and water—taken together, would give a total of £1687 for tenant's profits. For undertaking the management of the works, he ought to have 12½ per cent. upon the income as his own profit, which would give him £414 per year for his remuneration. That would leave £1273 as the sum which the tenant could afford to pay to the company for the works for a year. But the company would be liable to a variety of charges in the mean time, from which the tenant would on a non-repairing lease be exempt. For instance, there would be such charges as wear and tear, and other incidental items, in connection with the repair of the works. A tenant under such conditions could give, and I would give it myself, £1200 per year, not being liable for repairs. I would give more than that for a reasonable term.

Mr. OTTER: How much more.

Witness: I would give £200 more, at least, for the gas works, but not for the water works, as there are a variety of trades which the gas companies carry on independent of gas, and which form a part of the generel profits.

Examination continued.—If a tenant gave that sum for the works per year, the company would have to expend £574 during the year, in order to keep the works in efficient order. If, as a tenant, I spent that sum, I should be standing in the same position as the company is at present. Then the net rental would be £699.

The CHAIRMAN: Having gone over these different modes of calculating the rateable value of these works, do you consider, from your experience, that £699, or say £700, would be a fair rateable value for these works?

Witness: It is.

By Mr. OTTER: In taking the calculation on the gas, you say you would give £1273 as a tenant, for the works per year, on a non-repairing lease, and that the company would have to expend £574. Why would that sum be expended?

Witness: In consequence of the depreciation of works, and the reproduction of apparatus, with other expenses. Thus the company would have to lay by or expend £574 per year to meet the expense of obtaining new apparatus, which are heavy charges occurring at long intervals. It is exactly the same as with regard to locomotive engines, which in a certain number of years are "done up," so to speak, and, of course, new ones are required.

In giving the charges for these expenses, I calculated them on the quantity of gas manufactured, and not the quantity actually sold. There are several items included in that one of £574; for instance, I have taken depreciation at 5d. Depreciation includes renewal and adaptation. There is a difference between renewal and reconstruction.

Mr. Otter: You have taken the annual value of the property at five per cent.; but, supposing the property returns ten per cent., would you in that case make any difference in the valuation?—No; because the value of the buildings and works would be the same. I should do so for this reason: ten per cent. is made up of two elements, supposing it were returned; one of which may be called the rent, and the other the profits of the manufacture carried on in the premises. Take, for instance, the house of a banker. If it were really a private house, it might be rated at £100 per year, but, in case his banking establishment were connected with it, it might be returned at £20,000, if his profits amounted to that sum, according to such a principle. In my opinion a tenant would not give a larger sum for any property on account of its returning an extra large per centage. The remainder, above five per cent., would be for the good will of such profits carried on in those premises.

The Chairman: Then, do you mean that if a house is let for £30 per annum, and turned into a shop, or licensed, so that it would let for £80, he ought not to be rated at any more?

Witness: Yes; in that case he must be rated at more, because there has been a larger sum expended upon the house for the purpose of that business.

By Mr. Grey: I have made my calculations, in the first instance, from what I actually observed in regard to the gas works, applying my experience in other places.

By the Court.—Supposing that there were in the market-place, in Durham, two shops, in which the same business was carried on, and cost exactly the same, and one tenant made £1000 per year profits, and the other only £500, I should rate both exactly the same, as the value of the premises were alike.

Examination continued.—Coal brought rapidly from the pit does not make any appreciable difference in the production of gas, than if it were laying by.

Mr. Otter: Now about water?—I got this return of £900 as the rent of the water works in last September. I am not sure whether this company were supplying water to the Stockton, Middlesbro', and Yarm Water Company, in August, 1851; and I have not made any calculations in respect of any such supply. They will get two-sevenths of the gross earnings of that company; but that is put down to cover the whole of their expenses. I believe they have received nothing whatever from that company at present. In the item of £291, which I have given as the structural value of the gas works, I have included the value of the land occupied by the pipes, not the pipes themselves. There are 9970 yards of gas-piping in the parish of Darlington. I do not know exactly how many yards of piping there are for the water; but I believe, as nearly as possible, eight miles, or about 14,000 yards. The amount of capital invested in the water works is £14,337, which includes engine, pipes, filtering-beds, reservoirs, and everything connected with the works. I have taken the price of coal consumed at the gas works at 6s. per ton, which includes leading. There would be eight cwt. of coke got from a ton of coal, which would not bring more than 3d. per cwt., thus making 2s.; but in towns where coke is largely used for purposes of manufacture, as in Birmingham, it sells for a much higher price.

Mr. Grey: In consequence of some questions put to you, relative to your second mode of ascertaining the rateable value of property, you said you would not rate a house that returned profits at 10 per cent., at any larger sum on that account. You then distinguished between a rate to be made merely from the premises, and a rate to be made from consideration of profits of trade. Now, where you valued it at 5 per cent., did you include in such valuation all utensils and apparatus used?

Yes; the utensils and apparatus are fixtures in the building. When I estimated the rent of works at 5 per cent., it would be very much more than if it was merely a house or building, not used for manufacturing or trading purposes.

In estimating the rent for the water works at £900 per annum, you did so upon the sources open to you; but, if it should turn out that the real rent is below that sum, would you make a proportionate allowance to the tenant?—Yes, certainly.

Also upon the valuation of the gas works, if the quantity of coal turned out to be more than you have calculated upon, would that in any way invalidate the mode in which you have made your calculation?—No. If there was as much more coal used, it would, of course, influence the result, but would not double it. Such a quantity as 200 additional tons of coal would not make any more income, but only add to the expenditure. Providing that 9000 cubic feet of gas had been generated, if more tons of coal were used than I have accounted for, such a fact would not in the least invalidate my testimony. In treating the matter in every possible way that could be thought of, the result is nearly the same; nothing has been strained, and all the calculations are founded upon my experience as a gas and water engineer.

Mr. Grey then called *Mr. William Hildreth*, who deposed as follows: I am one of the clerks of the gas and water company. Mr. Henry Robinson was the secretary. I produce one of the company's books. As entered in it, the water rent for the half year ending December, 1851, was £382. 5s. 7d.; and for the half year ending June, 1852, £421. 4s. 8d., giving a total for that year of £753. 10s. 3d. The dividends are paid in February and August. Whether the same dividend will be more next time or not, as before, I cannot tell. The last call was paid on Dec. 15; it was £1. 5s. per share, which gives £2250. The previous call was made on Nov. 30, at £1 per share. All the calls have hitherto been made only upon £900. On June 30, 1852, there was divided £843. 15s. Of this, £562. 1s. 10d. was divided on old shares, and £281. 5s. on new; there was £24. 6s. 3d. paid during the half year for interest upon calls paid up; also interest upon calls prepaid, £20. 1s. 5d; £193. 4s. 3d. was paid as interest upon borrowed money during the half year. All the expenses have been paid before the dividends have been declared. For a ton of coals, 5s. 9d. has been the amount usually paid—that is, not delivered at the works. During the half year ending June last, £392. 12s. 5d. was the amount expended for coal. For depreciation of stock, £112 is charged. The total expenditure between December, 1851, and June, 1852, is £490. 15s. The total amount of expenditure for gas alone, including all charges and dividends, was £1971. 3s. 11d. From which deduct for depreciation, £112. 10s.; dividends, £562. 10s.; interest, £291. 5s. 3d.; management, £80; interest on shares, £274. 10s. 7d.; which amount altogether to £1320. 15s. 10d.; which, being deducted from £1971. 3s. 11d., give a clear sum of £658, after deducting all expenses. The total receipts from the gas works amounted to £1439, 2s., from which remained, after deducting £658. 1s. for the working management, left £781. 1s. The receipts for water in the half year ending July, 1852, was £803. 10s. 3d.; the total expenditure, £200. 10s. 8d.; giving a clear sum of £602. 19s. 4d. This company is supplying the Stockton, Middlesbro', and Yarm Water Company with water. They are also to receive two-sevenths of the gross earnings of that company. They have not paid us anything yet. The recipts for the half year ending June 30, 1852, is £2120. 10s. 11d., including both gas and water; and the expenditure as returned to the overseers was £1564. 3s. 3d. I believe that is a true statement. The expenditure includes both dividends, and interest paid on borrowed money.

The Chairman: The deduction for depreciation should not be deducted from the gross sum, but from the amount divided amongst the shareholders.

Mr. Otter: By deducting £752. 18s. 1d.—the amount of working expenses—from the half year's receipts of £1437. 17s. 8d., the net profits from gas for a half year are £674. 19s. 7d.

Mr. Liddell: That includes depreciation, tenant's profits, annual repairs, and several other deductions.

The Chairman: Would it not be better for you to agree mutually upon the amount of assessment?

Mr. Otter said, as he had stated in the first instance, there were two responsible persons present who would undertake to give the amount of the rate, £1600, for the works upon lease. He then read from the company's act the clause relating to the lease, which stated that it should be lawful for the company to lease the rates derivable from the works.

Mr. Grey: It says nothing about leasing the works; I am sure it cannot be done.

The Chairman: Mr. Hawkesley had said he would give something like that amount himself for the works: but he explained his reasons why a great proportion of such an amount was not rateable.

Mr. Grey: I was going to ask the witness whether the dividend was not partly paid out of capital, as he believed it was. The gas works, again, were perfectly new, and a large sum had been expended for new retorts and other apparatus.

The Chairman: We do not mean to say what is the precise amount at which the rate must be put down, but can say pretty nearly what it should be. We really do think that you might mutually arrive at it yourselves. We do not think that the profits should be taken as the standard of the rate.

Mr. Grey: With regard to the water, Mr. Hawkesley went upon the supposition of the rent being £900, whereas it is only £800. With regard to the consumption of coal, it appears from the books that, instead of its being 1550 tons, during the last year it was 1769 tons. Of course that would proportionably make the sum put down for gas something more.

Mr. Otter: Here is the dividend which they have divided; they cannot get over that. Notwithstanding all expenses, they have divided, it appears, £1681 for the current year.

Mr. Liddell: That is no criterion. According to all decided cases, if the proper amount had not been deducted, it ought to have been. We are prepared to show that it has not.

Mr. Grey: That is quite right. We want to conceal nothing, but do not want any injustice. That sum has, no doubt, been divided; but, then, it had been partly paid out of the capital, which the company were obliged to do, in order to pay it. That sum included all the profits realised from the works in every shape. But Mr. Hawkesley had explained why it would be unreasonable for a man to take the works just at the profits they realise; and the court might depend upon it that the company was rated just double to what it ought to be.

Mr. Otter: There is £112 paid half-yearly for depreciation, or it must be laid by—that is, taken out before any dividend is paid.

Mr. Otter [to the last witness]: Have you any reserved fund for depreciation?—No, we have not.

Mr. Grey: They have given us credit for a reserved fund, and we have not a farthing. It is not in existence; we have not any such money laid by for that purpose. My friend makes it out to be £1100; why, it was actually taken to build the new works.

The Chairman: Can you not agree as to the amount? The court has come to the conclusion as to the sum, not precisely, but something near to it, at which the rate should stand.

Mr. Grey: I have perfect reliance upon the court, that they will do justice.

The Chairman: Our conclusion is, that the gross rate should be £900, and the net £750.

Mr. Otter said, that sum had been proposed by the other party, but the gentleman who had instructed him had refused to accede to the offer. Now, as it had terminated in this way, it would be more satisfactory to both parties that each should pay their own costs.

Mr. Grey: We have appealed against £1600, and been put to a great deal of trouble, and we ought not to pay the costs.

Mr. Otter: That is unfair. The appeal would not have been necessary if you had allowed the overseers to examine your books; but

you refused to give them the information they required. There was, also, another thing which he must mention: the company was bound by act of Parliament, under a penalty of £20 for noncompliance, to file a statement of their accounts every half year at the office of the clerk of the peace. Such had never been done yet.

Mr. GREY contended that every facility had been given to the overseers which was reasonable and of service to them, in enabling them to form an opinion of what would be the proper amount of rate for the company to pay. They had been rated nearly double at what the court had adjudged them to pay; and therefore, in all fairness, they were entitled to the costs.

The CHAIRMAN said it appeared that the information given to the overseers was not sufficient to enable them to form a proper conclusion, as they had so far gone beyond what the rate should be.

Mr. GREY said they had rated them at £1600 when their income-tax return only gave £1387, which included all the profits. He was perfectly certain that, if they had formed their conclusion from the information which had been afforded them, the company would not have seen fit to have appealed.

Mr. OTTER: It is a compromise, and, therefore, the costs ought to be paid by each party themselves.

Mr. GREY: When the rate had been reduced to nearly one-half, surely it was nothing but common justice to allow the appellants the costs. As a matter of principle, too, he hoped the court would do so.

Mr. OTTER: In every compromise, each party pay their own costs.

Mr. GREY: It is all very well for you to say so, but this is no compromise.

The COURT then decided that the respondents should pay the costs, to be settled by the clerk of the peace.

Miscellaneous News.

DR. LETHEBY'S FOURTH REPORT ON THE GAS SUPPLIED BY THE GREAT CENTRAL GAS CONSUMERS' COMPANY.

TO THE HONOURABLE COMMISSIONERS OF SEWERS OF THE CITY OF LONDON.

GENTLEMEN,—I have the honour to present my Fouth Quarterly Report, on the illuminating power, and chemical quality of the gas supplied to the City of London, by the Great Centeral Gas Consumers' Company.

Since the date of my last report, in November, 1852, I have made 285 experiments on the illuminating power of the gas. These experiments have been conducted as heretofore; namely, with three kind of burners, and two kinds of illuminating agents. The burners are, an argand of 15 holes, having a 7-inch chimney, and consuming 5 cubic feet of gas per hour, a No. 4 fish-tail and a bat's-wing, each of which consumes 4 cubic feet per hour; the illuminating agents were, a wax candle of 6 to the pound, burning on an average 172·6 grs. per hour, and a sperm of the like quality consuming 130·7 grs. per hour. In the following results each of these have been reduced to a standard value of 120 grs. per hour.

The lowest amount of light emitted by the *argand* has been equal to that of 13·5 standard wax candles, and its mean intensity during the quarter has been that of 15·9 of such candles; so that it has had an illuminating power of full 32 per cent. over that required by the act of Parliament. This, however, indicates the value of the gas when the candle has been burning at its best, or nearly so; for when the candle has been allowed to remain in an undisturbed condition for a period of from fifteen to twenty minutes, its illuminating power has been, on the average, equal to 20·9 of such candles. The *fish-tail* has had a mean intensity of 11·2 wax candles, and of 9·8 sperm. The light of the bat's-wing has had an average value of that of 11·2 wax candles, and of 9·8 sperm.

The specific gravity of the gas, during the quarter, has ranged between 391·7 and 428·5; the average having been 410·6.

In the course of the quarter, I have occasionally noticed the presence of a small quantity of sulphuretted hydrogen in the gas; but I am bound to state that, whenever I have informed the Company of this fact, a remedy has been immediately applied, and the gas has been brought up to its standard quality.

Twelve months have now elapsed since I had the honour of being appointed by the Court of Common Council to the office of chemical referee, under the act of Parliament; and, on closing the labours of the past year, it is my duty to present you with a general report on the results thereof. This I now proceed to do:—

The total number of experiments which I have made on the illuminating power of the gas alone, amounts to 802; and I may, perhaps, be permitted to add that I have made a still larger number on the gas supplied to the City of London by other companies, in order that I might, for my own satisfaction, institute a fair comparison between them. These experiments show—

That the gas supplied by the Great Central Gas Consumers' Company has had an average value of 15·8 standard wax candles; or, in other words, that it has been nearly 32 per cent. greater than that required by the act of Parliament.

Its mean illuminating power, as compared with that of a sperm candle of 120 grs. per hour, has been equal to 13·8 of such candles.

The No. 4 *fish-tail*, when consuming 3·75 cubic feet per hour, has given a light of 9·1 wax candles, and of 8·1 sperm; and the *bat's-wing*, when burning at the same rate, has had an intensity of 8·7 wax, and of 7·7 sperm. When the consumption of the *fish-tail* has been raised to four cubic feet per hour, its light has been equal to that of 10·9 wax, and of 9·5 sperm; and the *bat's-wing*, with a similar increase of consumption, has risen to 10·8 wax, and to 9·3 sperm.

In my first report, I took the opportunity of stating that it would be very desirable to change the standard of consumption, by substituting a sperm candle of 130 grs. per hour, for a wax of 120. I now submit to you, as the result of further experience, that this is absolutely necessary, in order to obtain correct results; for I have found, in the first place, that it is impossible to procure a wax candle whose consumption shall be equal, or even nearly so, to that required by the act of Parliament. Secondly, that the rate of consumption is liable to considerable variation, in fact, it ranges between 130 grains per hour, and 198; and, thirdly, that the light emitted from the candle is so much affected by treatment and accidental circumstances, that it is difficult, if not impossible, to say when it is in a fair condition for comparison. In my own experiments I have always turned out the wick, so as to prevent an accumulation of carbon, or snuff, and then the mean intensity of its light has been about one-sixteenth that of the argand; but when the candle has been allowed to remain in an undisturbed condition for a period of twenty minutes, the amount of its light has fallen, on an average, to one-twentieth of the argand; that is, it evolves 25 per cent. less light under the latter circumstances than it does under the former. These differences arise from several causes, as—

1. From irregularity in the structure of the wick.
2. From alterations in the position of the wick, with respect to the flame.
3. From differences in the composition of the candle; and,
4. From variations in the temperature of the room.

Taking all these difficulties into consideration, and perceiving that many of them are uncontrollable, it does appear to me to be advisable that the standard of comparison should be changed, and that we should employ a sperm candle of fixed value for the wax of 120 grains per hour. The results of my experiments during the last twelve months, amounting to more than 1000 in number, might be made the means of estimating the relative values of wax and sperm as illuminating agents. These experiments show, that for equal weight of consumption, namely, 120 grains per hour, their relative values stand in the proportion of 13·8 to 15·8, and, with the permission of your honourable court, I will hereafter adopt these numbers as the basis of future calculations, making my experiments with a sperm candle instead of a wax one.

I have the honour to be, gentlemen, your faithful servant,

HENRY LETHEBY, M.B.,
Professor of Chemistry in the London Hospital.

London Hospital, Feb. 11, 1853.

THE SCOTCH IRON TRADE.

The following statistics of the trade have been compiled by Mr. Thomas Edington, of Glasgow:—

CONSUMPTION OF PIG IRON DURING 1852, IN IRON FOUNDRIES NORTH OF THE FRITH OF FORTH.

Counties.	Number.	Tons melted.
Fife	9	5,000
Forfar	8	2,970
Aberdeen	6	3,000
Inverness	2	130
Clackmannan ..	2	1,960
Elgin	2	300
Perth	2	300
Caithness	2	60
Banff	1	100
Ross	1	0
	35	13,820

SOUTH OF THE FRITH OF FORTH.

LANARK—			
Glasgow—North Side	18	37,600
— West Side	10	18,600
— South Side	9	13,153
— East Side	9	12,200
Other Towns, &c. ..	16	22,300
	62	103, 850

OTHER WESTERN COUNTIES.

Renfrew	14 ...	14,340
Ayr	11	5,400
Stirling	5	19,120
Dumfries	2	600
Dumbarton ..	2	1,250
Argyle	1	50
	35	40,760

EASTERN COUNTIES.

Edinburgh	14	6,800
Haddington	5	200
Berwick	2	3,800
Linlithgow	2	650
Roxburgh	1	60
Selkirk	1	300
	25	11,810

ABSTRACT OF TOTAL QUANTITIES CONSUMED IN IRON FOUNDRIES.

North of Forth ..	35	13,820
Lanarkshire ..	62	103,850
Other Western Counties	35	40,760
Eastern Counties ..	25	11,810
	157	170,240

CONSUMPTION OF PIG IRON DURING 1852, AT MALLEABLE IRON WORKS.

Lanarkshire ..	8	
Ayrshire	1	
Edinburghshire ..	1	
Fifeshire	1	
Total ..	11	120,000 tons.

NOTE.—The work in Fifeshire melted English iron entirely, brought down from Newcastle-upon-Tyne.

SUMMARY.

Consumption at Foundries for 1852	..	170,240
" Malleable Iron Works..		120,000
Total	.. ..	290,240 tons.

The total consumption for 1851 is generally believed to have been greater than that of 1852 by about 10,000 tons.

SCOTCH PIG IRON WORKS, Dec. 31, 1852.

Counties.	Works.	Furnaces: In Blast.	Out of Blast	Total.
Lanark	14	76	16	92
Ayr	8	22	12	34
Stirling	1	2	1	3
Linlithgow.....	1	4	0	4
Fife	2	7	1	8
Clackmannan....	1	2	0	2
	27	113	30	143

The average quantity of pig iron produced per furnace, during 1852, at all the above works, is generally believed to be, as near as possible, 135 tons each per week.

	1851. Tons.	1852. Tons.
Production	770,000	770,000
Stock, Dec. 31	350,000	450,000
Shipments, Foreign and Coastwise ..	453,000	424,000

Part of the pig-iron included in the shipments for 1852, in the foregoing statements, is also included in the consumption for the whole of Scotland. For example, a great part of the pig-iron melted north of the Forth must appear in the shipments, and partly sent there by railway. The same remark applies to other districts distant from the iron works. No accurate return has yet been made out of the pig-iron sent to different parts of Scotland by railway. The statements regarding shipments coastwise, local consumption, and consumption throughout Scotland generally, can only be an approximation to the truth, by these different heads being mixed up together so much that it would be exceedingly difficult to separate them accurately. The information regarding the consumption for 1852 has been derived partly from the consumers themselves, partly from parties who sold the iron to the consumers, and partly from other correct sources; and the details have all been revised by parties in the iron trade well qualified to do so.

Under date of March 2nd, Mr. Edington makes the following remark on the present position of the pig iron market in Scotland:—

We notice that pig iron still maintains a price in the market of about 50 per cent. above the prices ruling nine months ago, and that the production has been increased by eight additional furnaces in blast in Scotland compared with the average of 1852. On inquiry as to the reason of the high price, we are told that the demand is enormous, and that the shipments from, and consumption in Scotland, in 1853, will be largely increased. Such, no doubt, are the expectations of parties who have been so rash as to purchase at such rates as were current of late. But we much fear that even present prices will tend to ruin many who are blindly following the unfounded statements of those who, having their own hands filled, are anxious to get fresh blood into the speculation, in order to relieve them of part of the loss. We would therefore call the attention of holders of pig iron to the fact that one highly respectable firm, whose works are not the most favourably situated for the production of cheap iron, stopped their works last year when prices came to 37s. per ton, but, on getting orders at 42s., blew them in again, showing that they are content to carry on their works at that price. Again, though the stock in Scotland on 1st January, 1853, was 450,000 tons, or 100,000 greater than on 1st January, 1852, and that, with the additional furnaces in blast, if iron do not go below 42s. per ton, the make will be at least 50,000 tons greater than last year.

We are told the consumption and shipping will be great. We have made inquiry, and learn from undoubted sources that our malleable iron works are all busy, but they were equally well employed during 1852, and with fewer speculators on their books as customers. Our founders are not, however, in this position, for we know that the largest works in our neighbourhood are not melting one-half as much as they were doing this time last year. They complain that, even at present prices, Belgium can beat them for foreign contracts in railway chairs, &c., and that France, helped by her home bounties, has taken the contract to supply Madrid with water pipes at a lower price than our founders could do, basing their calculations for pig iron at 56s. per ton. We also know that the founders of Pennsylvania undersold us in the States of New York, New Jersey, and New England, for heavy castings, and this at a time when iron was 45s., and freights 20s. per ton; whereas now freights are 35s. and iron 55s. per ton. All this proves that low prices increase consumption, while high prices decrease it.

The next point to consider is our shipping powers. We have at this time 250 vessels loading in Great Britain for Australia. Many of these are not intended to return. Freights have risen in many cases 100 per cent. above last year's rates, which of itself gives foreign countries to the extent of an ordinary freight in their favour, as well as the additional price on our iron, to enable them to compete with us. All this shows that holders of iron should examine well for themselves as to the stock, make, and consumption, when they will find that the make at present is at the rate of 825,000 tons per annum; the stock is now greater by 30,000 tons than it was two months ago; and that if we have not orders and machinery to consume more than last year (which high prices prevent), or ships to take it away (which we have not), the increase of stock in Scotland by the end of the year will, in all probability, bring prices to a lower point than they reached in 1843.

LEWES GAS LIGHT COMPANY.

A special meeting of the shareholders of the Lewes Gas Company was held at the Mechanics' Institution, Feb. 25, to take into consideration the propriety of altering the price of gas. Mr. Burwood Godlee occupied the chair.

Mr. AUCKLAND, the secretary, read the following Report:—

"The directors of the Lewes Gas Light Company have unanimously agreed to submit to the shareholders a resolution that the price of gas supplied by meter to private consumers should be reduced, from and after the 25th day of March next, from 6s. 8d. per 1600, or 8d. per 100 feet, to 5s. 10d. per 1000, or 7d. per 100 feet; and they have directed their chairman to take the sense of the shareholders upon a motion to that effect.

"This determination has been arrived at after much discussion, and with a full admission by all the directors that plausible reasons for and against such a course may be urged. It has, theretore, been determined to put the most prominent arguments on either hand *in extenso* before the shareholders, in order that they may, as far as possible, exercise their own individual judgment in deciding the point in question.

"There are, among the directors, those who believe that the reduction would prove, in all respects, an advantage to the company, by increasing the consumption of gas so considerably as to do more than compensate in profit for its diminished price. It is impossible to lay any data before the shareholders in proof or disproof of this assumption, which must continue to be, after all, very much a matter of mere opinion.

"How far it may be wise as a matter of policy or of justice to make the proposed reduction is more within the scope of discussion; and the arguments urged in its favour are based first and generally upon the fact, that the course hitherto pursued by this company in reducing the price of gas by successive steps from 15s. per 1000 feet to its present rate of 6s. 8d. per 1000 feet (with a single small exception only) almost before *any* desire had been expressed by the consumers for such reduction, may fairly be assumed to have been a correct one, inasmuch as almost, or entirely, without exception, the experience of other companies has shown that either voluntarily or by coercion such reduction must have eventually taken place, and it follows necessarily that it has been wise gracefully to yield by anticipation what could not eventually have been maintained against a fair and well-grounded agitation; if, however, it be admitted that the reductions hitherto made were wise and just, it would follow that the large increase of consumption anticipated by supplying the county gaol, which to a certain extent *pro rata* will diminish the cost of production upon the entire quantity manufactured, should be accompanied *pars paribus* with some diminution in the general price—it is upon this principle that a price of 5s. per 1000 only was demanded from the county for the supply of the new gaol, which price may be roughly considered as equivalent to the 5s. 10d. now proposed to be charged to the general consumers of smaller quantities; and the reduction of the price to those parties to 5s. 10d. per 1000 feet may be therefore considered as the legitimate consequence of the contract made last year for the supply of the gaol. The question of what is the fair price to charge for gas to the consumers in Lewes, has always been complicated by a legacy left to the present directors from their predecessors, in the adoption of which they had, consequently, no control; that is to say, with a contract at an exceedingly low price for the supply of the public lamps, being upon a scale of charge about equivalent to that adopted in almost every instance by gas-light companies formed at an early stage of the art of gas lighting, as well as for long subsequent periods.

"The only mode by which this practical error could be met, was by indemnifying the contracting company at the expense of the private consumers, by charging them an extra and unfair price; and this plan has been, in fact, extensively adopted by this and most other companies.

"The gradual increase that has universally occurred in the consumption of gas, has operated, with other causes, so far to reduce the cost of production, as to enable many gas companies very materially to modify, and, in some instances (though gradually, yet entirely), to obliterate this unfair proceeding by reducing the charge to consumers down to a level with that originally made for the public lights alone; this finale, however, has never been arrived at in Lewes, although it has been approached; but the more complete information which companies themselves, as well as the public, now possess upon this subject has prepared both parties for a change of system, and the time appears to have arrived when each question—namely, the fair price of gas to private consumers, and the fair price for the public lights, must be treated each upon its own merits; the price to consumers must be a fair one, and if the price for the public lamps be a losing one, that loss must be sustained by the supplying, and therefore consenting, company, and not by the private consumers.

"Such is the view taken of the subject at this time by your directors, and as the two questions are in themselves so essentially different, it appears to them to be the better plan to divide the discussion of them in point of time—and the question now before the meeting once disposed of, the directors will address themselves in earnest to that of the price to be in future charged for the public lamps; in furtherance of which they propose at the ensuing quarter-day to fix meters to a sufficient number of them in different parts of the town, to ascertain accurately what is the amount of their actual annual consumption, their knowledge in reference to which has hitherto been by no means accurate; and when this is satisfactorily determined, they propose to put an end to the existing contract, and base an offer for the future supply founded upon the result of actual experiment, and to decline under any circumstances to continue a losing bargain—a course which it is presumed the shareholders will fully approve and support.

"Having thus stated the principal ground upon which the directors propose to the shareholders the reduction now submitted for their approval, they further state that the best reasons which have been urged for maintaining the present price are:—

"1. The low rate of interest hitherto realised by the Lewes Gas Light Company.

"2. The great difficulty which it is feared will be experienced in indemnifying the company for any reduction to private consumers in the direction of an increased price for the public lamps.

"3. The increased rates now demanded for coal freight.

"4. The improbability, as is anticipated, of maintaining the expenses of the management of the company at their present low level even without the increased consumption consequent upon the supply of the county gaol.

"The directors trust that this full statement of their views may excuse them from any personal discussion beyond such explanatory remarks as may be required in reference thereto.

"*Lewes, Feb.* 25, 1853.

(Signed) BURWOOD GODLEE. HENRY DAVEY.
BENJAMIN FLINT. GEORGE COOKE.
HENRY BROWNE. EDWARD BEARD.
WILLIAM FARNES. EBENEZER MORRIS."

On the motion of Mr. W. Figg, seconded by Mr. C. Parsons, the report was received.

Mr. FLINT, jun., asked what had been the increase or decrease of the income since last reduction.

The CHAIRMAN said it was not easy to answer that question exactly, seeing that the reduction had not been made at the end of the financial year. The reduction from 8s. 4d. to 7s. 6d., gave them a rental in 1850 of £1129. The further reduction to 6s. 8d. took place within the following twelve months. The two reductions caused the rental to fall to £1038, but in the following year it rose from £1038 to £1082, but that was a larger sum than accrued when the price was 12s. 6d. The total amount of reduction had been from 12s. 6d. to 6s. 8d., while the rental under 12s. 6d. was £1070, the rental under 6s. 8d. was £1082.

Mr. MORRIS wished it to go forth that that meeting had been called out of consideration to the distant shareholders, lest it should be said they were altering the price here to benefit themselves as consumers. Taking his own case, for instance: he was a small shareholder and a large consumer, and the reduction of price would, therefore, be of great advantage to him. They, as directors, no doubt had the power of altering the price of gas; but he had pledged his word to a distant shareholder—one who held twenty-five shares—that he would not consent to any considerable reduction of the price of gas without a corresponding addition to the charge for the public lights, and without appealing to the shareholders at large, so as to do away with all foundation for the remark, that they reduced the price of gas in order to reap the advantage as consumers.

After a pause,

The CHAIRMAN said he should have hesitated much longer before he proceded further with the motion which he was about to put before the meeting, if its effect would be to preclude the opportunity of asking any questions or making any remarks; but these would be in fact perfectly in place after the motion was proposed. The motion was, that from and after the 25th of March next, the price of gas to the company's consumers be charged at 6s. 10d. per 1000 feet.

Mr. E. MORRIS seconded the resolution.

Mr. FLINT, jun., asked whether the probable effect of the reduction would be to give them five or six per cent.?

The CHAIRMAN: That question cannot be answered—it is a mere matter of opinion.

Mr. MORRIS urged a full discussion of the question. The directors would be glad to receive any suggestion from the shareholders.

Mr. DAVEY (silversmith) would like to have the opinion of some competent persons, whether it was likely the interest, in the event of the reduction being made, would keep up to its present amount, with the increased cost of management and the increased cost of coals?

The CHAIRMAN said it would be hardly fair to predict what effect it would have upon their interests. The first result of a reduction in price was to cause at once a diminution in the rental; for some time must elapse before the increased consumption, which, of course, could only grow up gradually, reached a point to make up for the reduction of price. But when they saw that, while they had diminished the price from 12s. 6d. to 6s. 8d., the revenue had been maintained, and that it was £12 more now than 10 years ago, it was not unreasonable to anticipate an increase in the consumption. How far that increased consumption would go was merely a matter of opinion.

The motion was, after some further discussion, put, and carried by a majority of four to one.

After the usual vote of thanks to the chairman, the meeting broke up.

MUNIFICENCE OF MR. CROLL.—From the *Times* of Feb. 17, 1853:

"GREAT CENTRAL GAS CONSUMERS' CO.,
"28, Coleman-street, Feb. 14.

"Mr. Sheriff Croll presents his compliments to Alderman Sir John Musgrave, and begs (in consequence of the present inclement state of the weather) to place at Alderman Sir John Musgrave's disposal 50 CHALDRONS OF COKE, to be given to those poor whom Alderman Sir John Musgrave may think most deserving. The coke will be delivered at the gas works, Bow-common, to the persons, in such quantities as Alderman Sir John Musgrave may direct.

"N.B. A chaldron of coke is 36 bushels, and is held in 12 sacks."

Similar letters have also been addressed to the magistrates of the six Middlesex police-offices, and published in the daily papers, announcing donations of 25 chaldrons of coke to each, for the same charitable purpose. A correspondent also draws our attention, in the following terms, to another instance of Mr. Croll's unostentatious benevolence:—

"Mr. Timothy Tickle presents his compliments to the editor of the JOURNAL OF GAS-LIGHTING, and begs to inform him that Mr. Croll (in consequence of the present inclement state of the weather) is reported to have placed 100 chaldrons of the best large coke at the disposal of the directors of the old Metropolitan Gas Companies, to be distributed amongst such of their distressed widow and orphan shareholders as may stand in need of assistance. A chaldron of coke is stated to consist of 36 bushels, or 12 sacks, and it will be delivered at the gas works, Bow-common; or persons can have it delivered at their residences on payment of the carriage, at the rate of 2d. per bushel, if within five miles of the works; or 2½d. per bushel, if beyond that distance, and within seven miles.

"*Gog-Magog Hall, Feb.* 17, 1853."

PHŒNIX GAS COMPANY.—At the half-yearly meeting of this company, held on the 23rd ult., a dividend was declared at the rate of 3½ per cent. per annum, about £600 being taken from the reserve fund to make up the required amount. Thomas Gibbes, Esq., was elected deputy-chairman, in the place of T. Allen Shuter, Esq., resigned. Richard Fall, Esq., and Edward Edwards, Esq., were elected as directors, and Mr. Joseph Box as auditor.

FATAL EXPLOSION AT NEWCASTLE-ON-TYNE.—On Saturday evening, Feb. 26, an awful explosion of gas occurred in a provision-shop, in Buckingham-street, Newcastle-on-Tyne, occupied by Mr. William Walker, which has resulted in the death of his wife. Mr. Walker is by trade an engine-wright, and his wife managed the shop in his absence. On Saturday evening, there having for some days been an escape of gas, which had become very offensive, Mr. Walker determined to ascertain the cause by an examination of the meter, which was situated in a confined space under the counter. He very imprudently took a lighted candle and opened a trapdoor which communicated with the place. The gas, which had been some time accumulating, immediately ignited, and caused a tremendous explosion, shaking the building to its foundation, and scattering bags of flour and other goods in all directions. The counter was torn to pieces, the shop windows blown out, and the building greatly damaged. Mrs. Walker was carried nearly out of the shop, and was taken up in a dreadfully mutilated state. Her husband, too, was rendered insensible, and both were conveyed to the infirmary, where both Mrs. Walker's legs were amputated the same evening, as affording the only chance of saving her life. The unhappy woman lingered till Tuesday morning, and then died. Her husband is recovering. A girl who was passing the shop at the time of the explosion was dreadfully cut in the face by some broken glass from the windows, but she also is recovering, though greatly disfigured. This distressing accident should serve as a caution to consumers of gas not to have their meters in such a confined situation. An explosion under similar circumstances occurred in Newcastle a few weeks ago, but was fortunately unattended with any personal injury.

Advertisements.

TO GAS COMPANIES, AND OTHERS.

WANTED to Purchase, a Set of Four Dry-Lime PURIFIERS and Centre Valve, with 8-inch Connections complete. Gas Companies enlarging their purifying apparatus will find this an eligible opportunity for disposing of the smaller.

Particulars to be sent to Mr. S. SCOLTOCK, Manager, Gas Works, STOKE-UPON-TRENT.

PATENT GAS METER MANUFACTORY, No. 66, Snow-hill, London.

WILLIAM SMITH, by the improvements he has made in the Wet Meter, and which he has secured by her Majesty's Royal Letters Patent, the accuracy of their registry is rendered certain by the introduction of the adjusting slide and hydraulic, whereby a Perfect Water Level is readily obtained, and the Hydraulic precludes the possibility of abstracting water from the meter by increased pressure or otherwise, thus surmounting the great desideratum of the Wet Meter. In his Patent Equitable Gas Meter neatness and strength are combined, the backs and fronts of the case being stamped by powerful machinery out of thick plate iron (tinned or galvanized); and the internal construction is of the best metal, which will resist the action of any impurity in the gas.

Old Meters may readily have the adjusting slide and hydraulic applied, thereby having accurate measurement assured.

Station Meters, Governors, &c., made on the shortest notice.

WEST and GREGSON,
GAS METER MANUFACTURERS, BRASSFOUNDERS, &c., UNION-STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

WROUGHT-IRON GAS AND OTHER TUBES.

CORNELIUS WHITEHOUSE and EDWIN DIXON,
WOLVERHAMPTON TUBE WORKS.

C. WHITEHOUSE, the ORIGINAL INVENTOR and Patentee of the Wrought-Iron Gas Tube in 1824, having unremittingly given his attention to the most perfect means of making this article (now so much required) for a period of nearly thirty years, begs with the utmost confidence to call the attention of Gas Engineers, and Consumers of Tubes, to the excellent quality now made at the above-named Works.

Specimens of Tubes, of any diameter, sent carriage free to any part of the Kingdom; and orders of any magnitude executed promptly, the stock on hand averaging generally from ONE to THREE HUNDRED THOUSAND FEET, with a corresponding quantity of Fittings.

Tubular Flues, for marine and locomotive Boilers, made on the most approved method, and of the best Charcoal Iron; also, Casings for Well Sinkers and Borers in search of minerals, with male and female joints, and a perfectly smooth and regular interior. Core Bars for Ironfounders, and Brass Gas Fittings of any kind for Plumbers or Gas Fitters.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn-hill, begs to inform Managers of Gas Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

CARTER'S PATENT SAFETY GAS VALVES.

THOMAS LAMBERT and SON, PATENTEES AND MANUFACTURERS, SHORT STREET, NEW CUT, BLACKFRIARS, LONDON.

The Bank of England is fitted entirely with these Valves, from the smallest branch to the largest main pipe.

The following, among numerous testimonials, will be found very satisfactory:—

"The British Gaslight Company's Office, No. 105, Broad-street, Ratcliff, London, June 10, 1846.

"Gentlemen,—In reply to your inquiry, I have to state that 'Carter's Patent Gas Valve' has been used by this company and by the fitters of the district extensively for seven years past. It was adopted to obviate the inconvenience of setting fast, so prevalent with the conical metal plug-cocks, and has been found to answer the purpose intended.

"I have recommended its use in several provincial towns with which I am professionally connected, and have not received any complaint of its having failed in any respect of performing satisfactorily all that is required of it.

"I am, gentlemen, yours respectfully,
"GEDDIE PEARSE.

"Messrs. Lambert and Son, Lambeth."